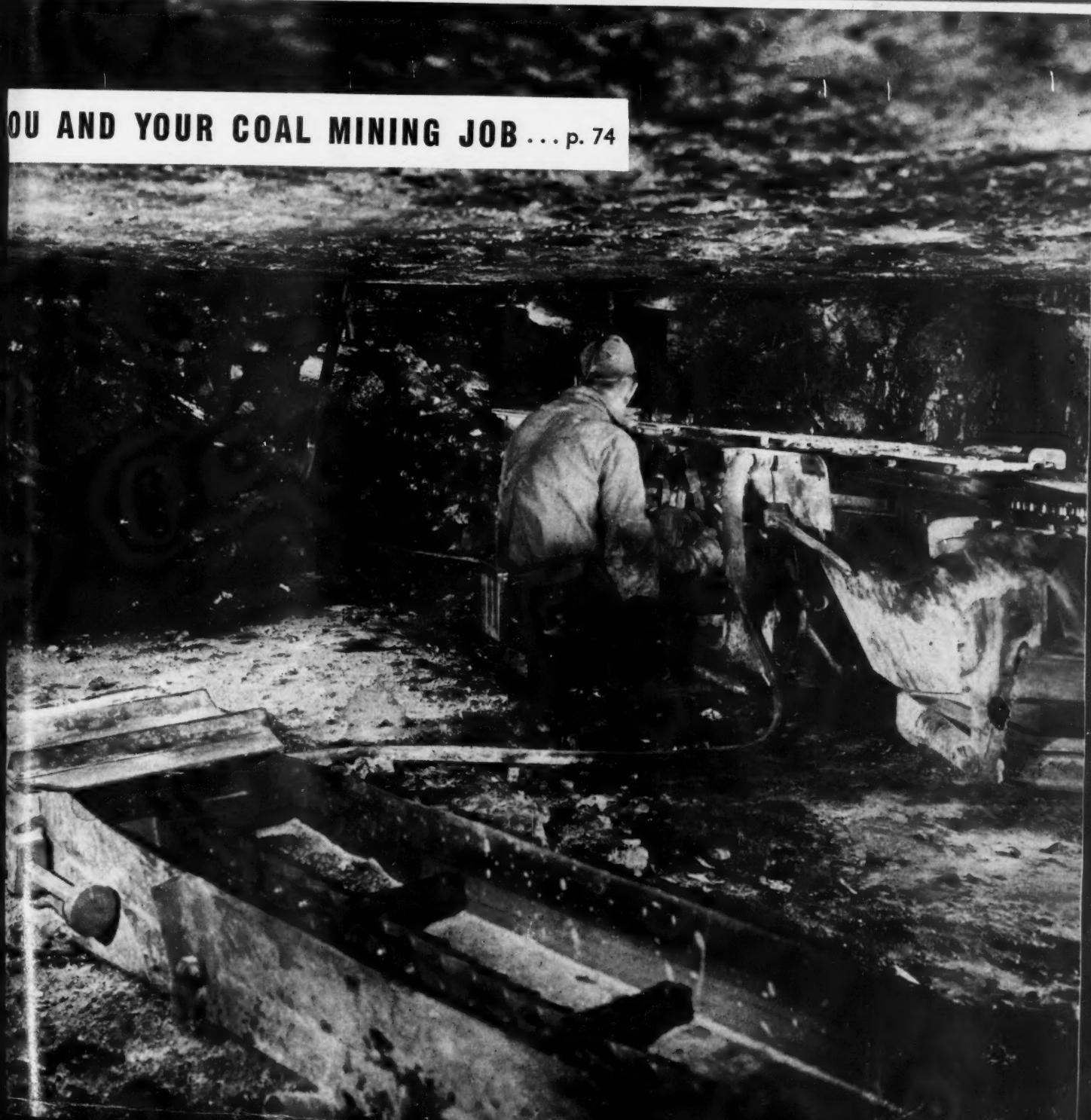


# Coal Age

A McGRAW-HILL PUBLICATION

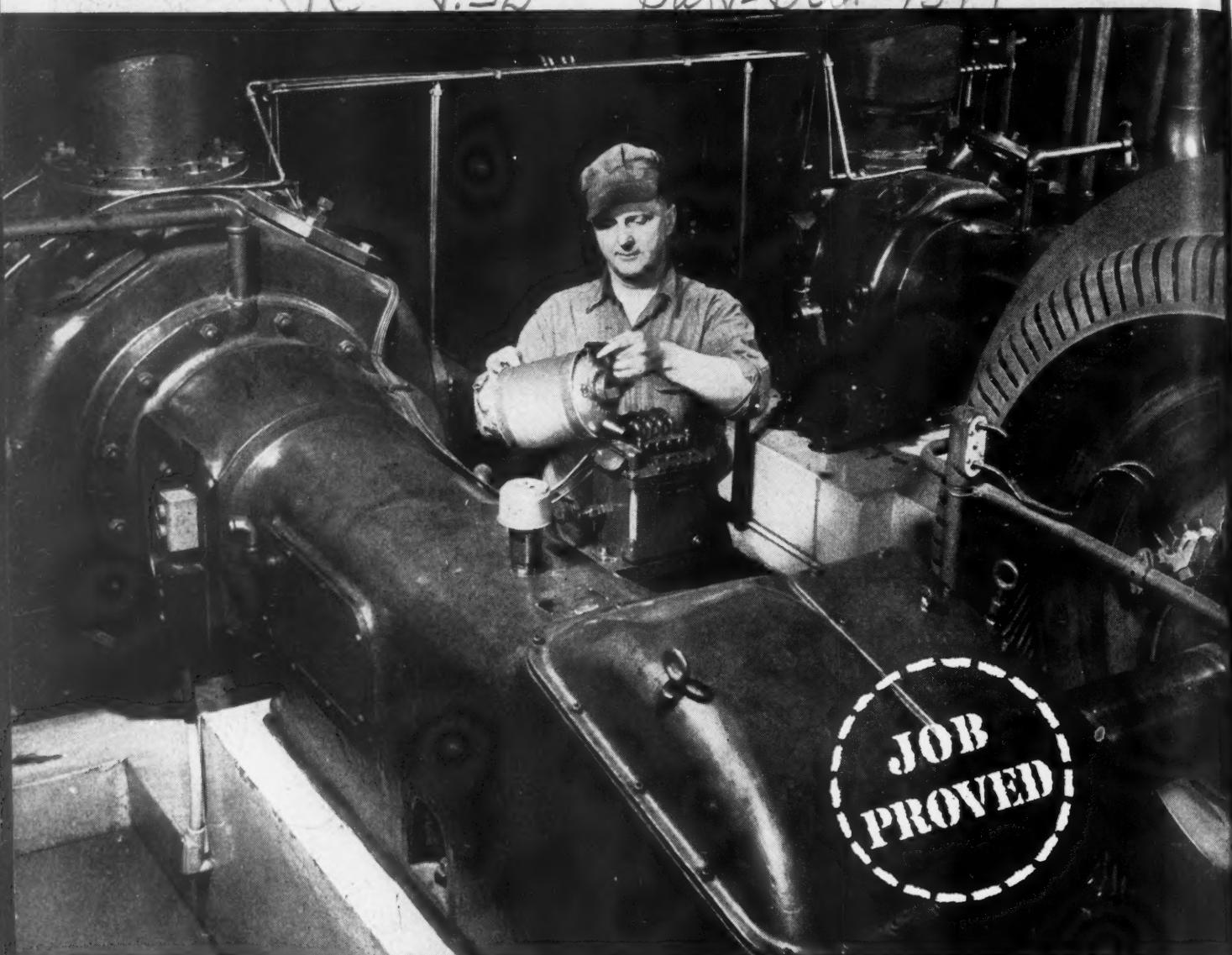
JULY, 1947

YOU AND YOUR COAL MINING JOB ... p. 74



# Three Years Without a Shut-Down

*VR v.52<sup>2</sup> July-Dec. 1947*



## SOLNUS OIL . . .

Keeps Vital Air-Compressor Operating 24 Hours a Day without Parts Replacement or Repairs of Any Kind

The multi-stage, duplex compressor shown above runs 24 hours a day, supplying the air vitally needed for various types of equipment.

**A few years ago**, while a well-known brand of lubricating oil was being used, considerable bearing trouble developed. A Sun Engineer, who was called in to study the operating conditions, recommended Solnus oils of the proper viscosity, and "Job Proved" in dozens of similar compressors.

**For more than three years now**, these Sun "Job Proved" lubricants have been in service. Crankcase temperature has been lower. Oil consumption has been less. No shut-downs or repairs of any kind have been necessary, and inspection has shown all parts to be clean and well lubricated.

**Records of this sort** are being made every day by "Job Proved" Sun products in hundreds of mines. For lubricants that give you maximum assurance of steady day-and-night operation, call your nearest Sun office or write Department CA-7.

**SUN OIL COMPANY • Philadelphia 3, Pa.**  
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**SUN**  
SUNOCO  
**INDUSTRIAL**  
**PRODUCTS**

*Seck*



## Red hot coke puts the heat on rubber

*A typical example of B. F. Goodrich product development*

THAT picture isn't blurred. The fog you see is a cloud of smoke and steam rising from the red hot coke on the belt.

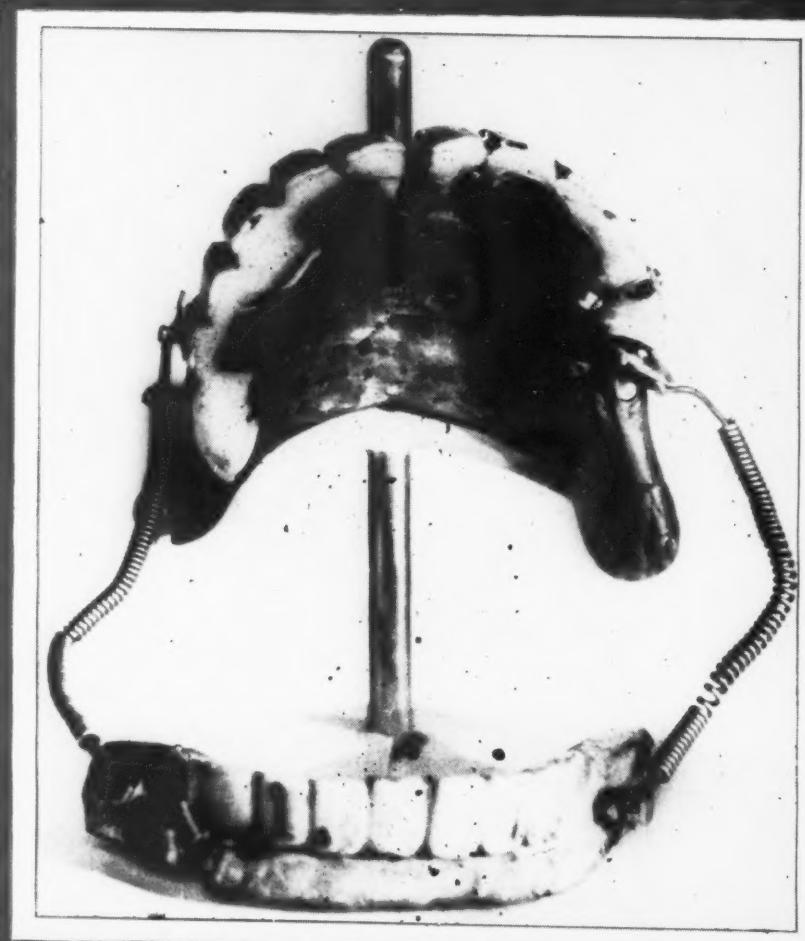
Rubber and fabric belts have always been the cheapest way to handle the hot coke. But sooner or later belts burned up—as a rule, sooner—and cost per ton was high. Finally the plant operator tried a belt made from an expensive synthetic—it carried 160,000 tons before it burned up. The operator was pleased—but not satisfied.

He asked B. F. Goodrich engineers what they could do about it, and here's what they did. Using their regular, inexpensive American-made rubber, they developed a new compound, especially designed to stand heat. They made a belt from this new rubber and put it in service. It was removed from service not six (the previous average), but sixteen months later. It had carried 248,000 tons of red hot coke—*half again as much as the best previous belt at a substantially lower cost.*

The development of new products and materials—like the new rubber for the belt—and the improvement of "standard" products have become a habit at B. F. Goodrich where engineers believe that *anything* can be improved. It's a habit that has brought increased efficiency, economy, safety and comfort to American industry and the American people. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

**B.F. Goodrich**  
FIRST IN RUBBER

# First in its Field....



"First in War—First in Peace"  
and first to wear...

## THE FIRST PORCELAIN TEETH

Here is the denture (false teeth, to you) of George Washington, as famous for his eating prowess as his generalship. These teeth were made of porcelain, first introduced about 1785, due principally to the efforts of Dr. John Greenwood, who also invented the foot-power drill. The first hard porcelain was commercially manufactured first in Philadelphia, about 1825, by William Ellis Tucker.

You really put teeth into your machinery lubrication program when you use HULBURT QUALITY GREASE! For it's a hard fact HULBURT Grease is made to do just ONE thing — and do it SUPREMELY WELL . . . i.e., lubricate Coal Mining Machinery the one RIGHT way. You take a big bite out of machinery operating and maintenance costs when you use HULBURT QUALITY GREASE.

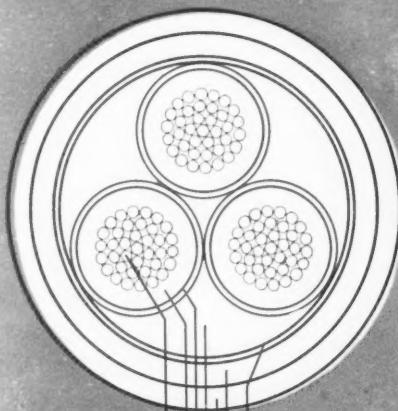
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*Specialists in Coal Mine Lubrication*

*...a record of  
American Leadership*



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Rubber-filled core tape binder.

Hazard Submarine insulation—moisture-resisting, extra-tough and resilient, non-corrosive and long-lasting. Has high dielectric strength.

Rubber-filled tape over each insulated conductor.

Saturated fillers to round out the core.

1 Tinned copper conductors.

2 Hazard Submarine insulation—moisture-resisting, extra-tough and resilient, non-corrosive and long-lasting. Has high dielectric strength.

3 Rubber-filled tape over each insulated conductor.

4 Saturated fillers to round out the core.

for **SAFE...SURE MINE POWER**

that helps

**KEEP PRODUCTION HIGH**

# HAZARD ARMORTITE

Custom-built to withstand the severe operating conditions encountered inside mines, Armortite also provides special installation advantages.



Located in the heart of an important mining area, Hazard has taken every advantage of its opportunity to design and build mining cables that are "tailor-made" to meet the requirements of the industry.

For example, take Hazard Armortite Mine Power Cable for inside power transmission and distribution. It's non-metallic armored, moisture-proofed . . . can be laid directly in a trench without conduit, run through pipe, or hung on messenger or supports inside the mine. Having neither lead sheath or steel armor wires, it's more simple to install and its light weight makes handling quick and easy. In more than twenty years, there has never been a service failure caused by faulty construction of Armortite.

Consult Hazard Engineers as to the type of cable to select for a specific application to assure maximum efficiency and service life.

Hazard Insulated Wire Works,  
Division of The Okonite Company,  
Wilkes-Barre, Pennsylvania.

# HAZARD

**insulated wires and cables for every mining use**

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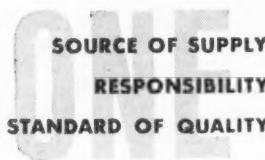
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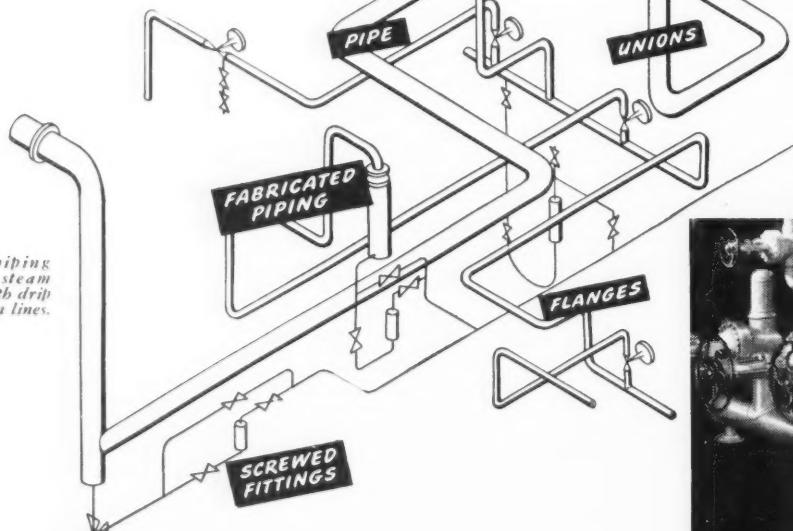
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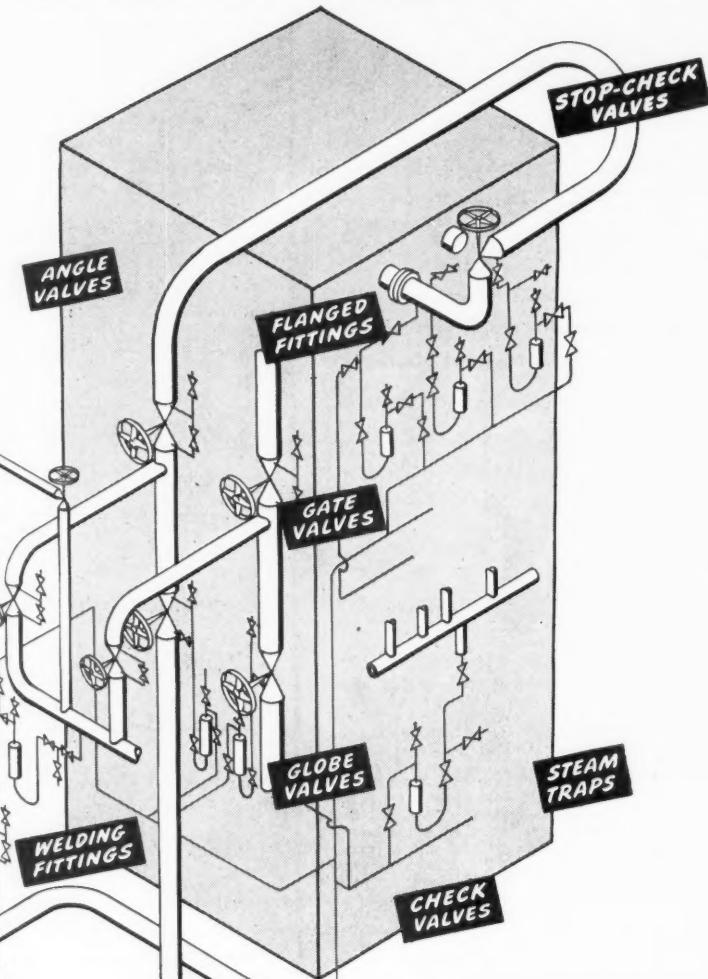


**EVERYTHING FROM . . .**

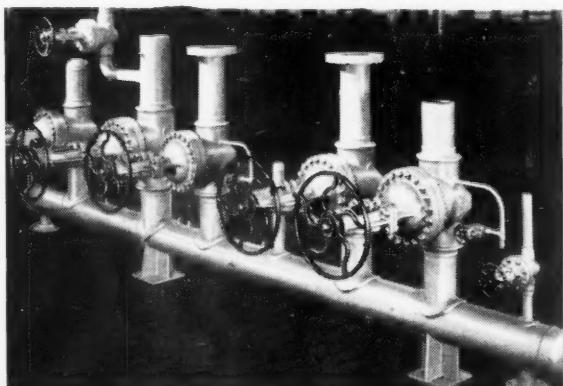
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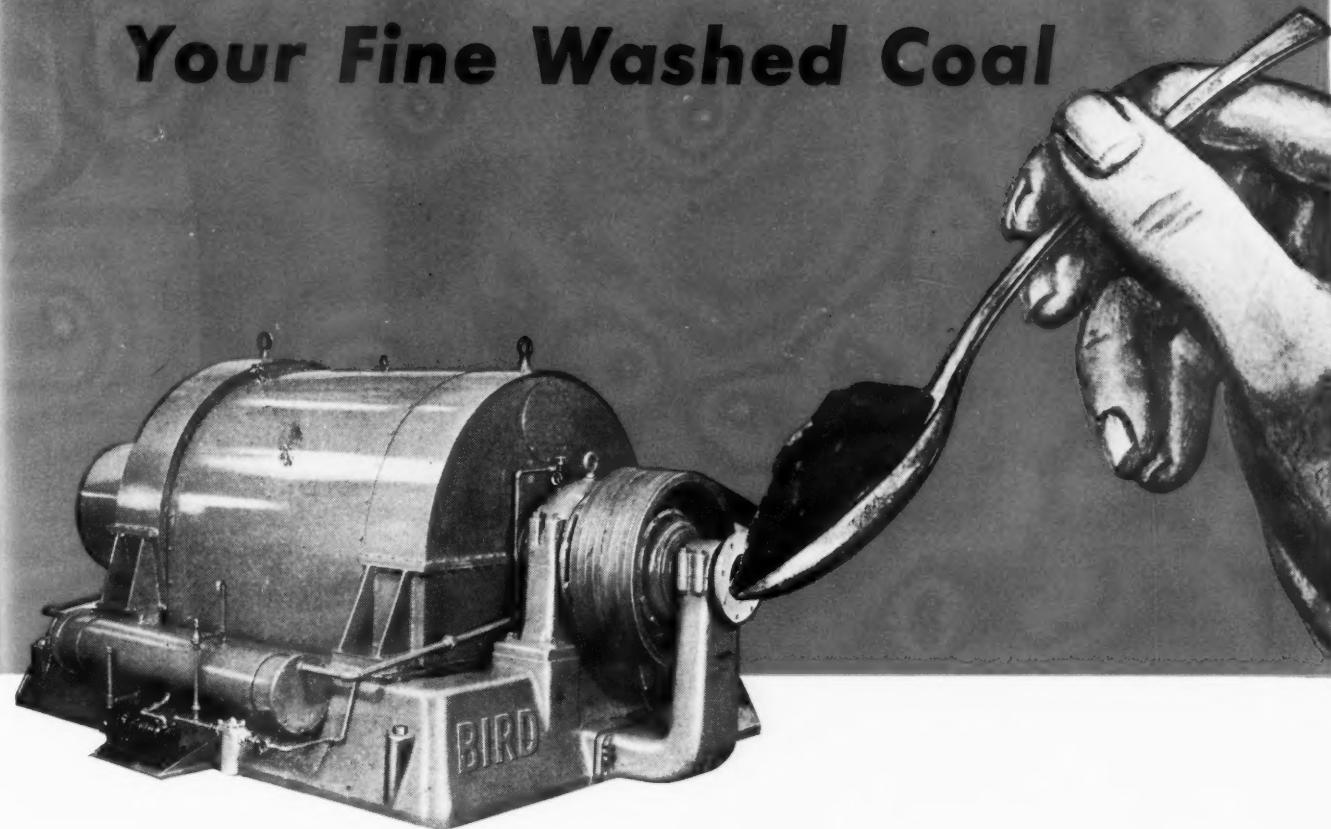
FOR EVERY PIPING SYSTEM



(Below) 10-in. MAIN STEAM HEADER completely shop-fabricated by Crane for a Mexican Central Station. Crane does the entire job . . . bending, welding, stress-relieving, testing, including radiographic examination. On large or small jobs, simple or complex, Crane fabrication fulfills every intent of your design.



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— if you want to get the water clean—ready for immediate re-use.

— if you want to get it *dry*—just right for blending.

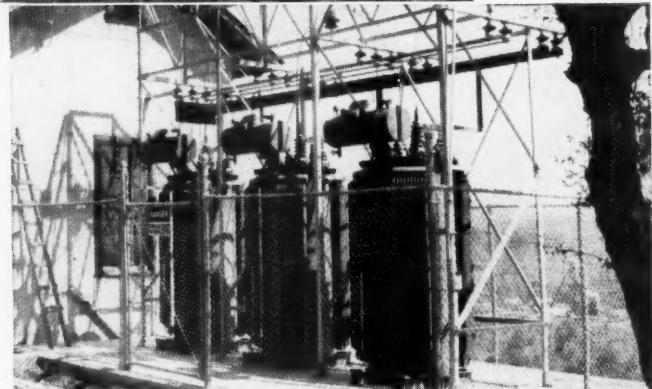
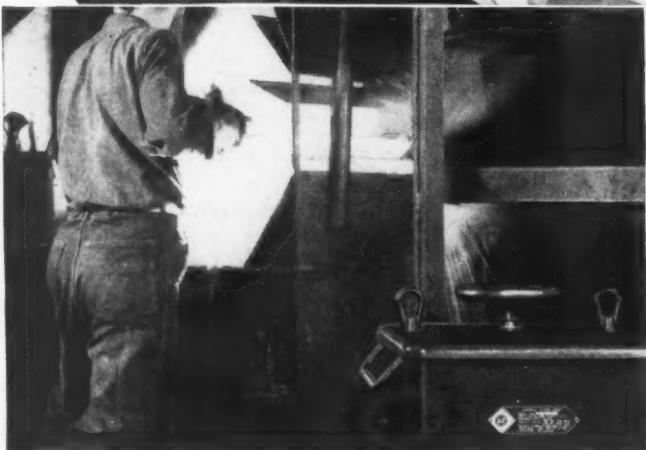
— and if you want to do it at low cost.

• • •

*For details of performance and cost,  
get in touch with Bird Machine Company,  
South Walpole, Massachusetts*

The BIRD

Continuous  
Centrifugal FILTER



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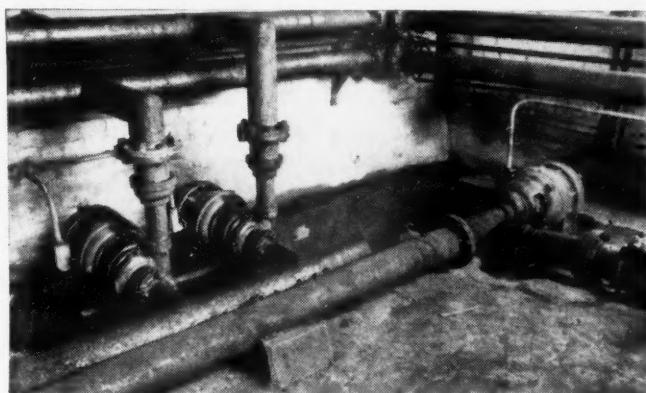
# 'WHAT DO YOU MEAN... Two Kinds of Equipment Costs?"

**C**ONSIDER NOT ONLY "How much will it cost?" but also "How much will it cost *if we don't buy it?*" when you plan ahead in coal. Chances are you'll find that "getting by" with half-worn or obsolete equipment will prove more costly than equipment modernization. That's why — in terms of operating efficiency, maintenance costs and pay-off time — new equipment is a sound investment.

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Plan now to strengthen your position for tomorrow's competition. Contact the A-Office near you. **ALLIS-CHALMERS, MILWAUKEE 1, WIS.**



## CENTRIFUGAL PUMPS

**COMPACT 55-UNIT PUMPS**, two 300 and one 600 gpm, used in connection with air purification in coal mine. These versatile Allis-Chalmers pumps handle either mine water or preparation plant water . . . internal parts are made of corrosion-resistant materials. Both motor and pump are one unit. Available with standard, enclosed fan-cooled, splash-proof, or explosion-proof Allis-Chalmers squirrel-cage motors. Capacities 10 to 2,500 gpm; heads to 575 ft. Two-stage pumps for high head pumping. **BULLETIN B6059C.**

## BASIC PROCESSING

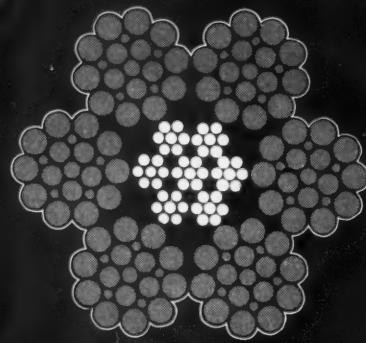
**WIDE APPLICATION RANGE** of the Low-Head Vibrating Screen is the result of two distinct types of screen decks. The End-Tensioned Deck, shown above, is used for sludge dewatering and fine screening down to 35 mesh. Conveying action of screen in combination with deck construction results in increased wet screening and dewatering efficiency. The conventional side tensioned deck is used for screening and dewatering larger size coal. Low-Head sizes range from 3 by 6 to 6 by 16 ft. Send for **BULLETIN B6330.**

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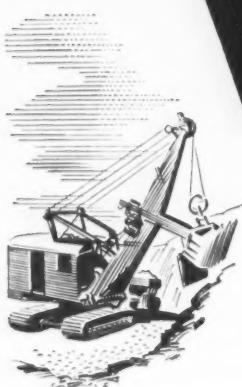


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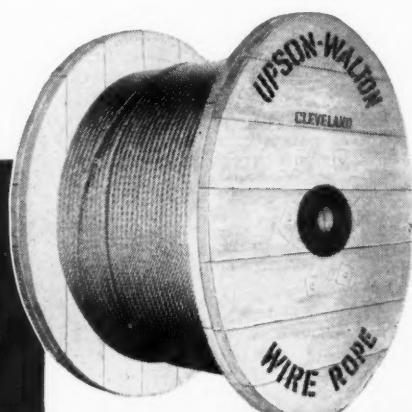
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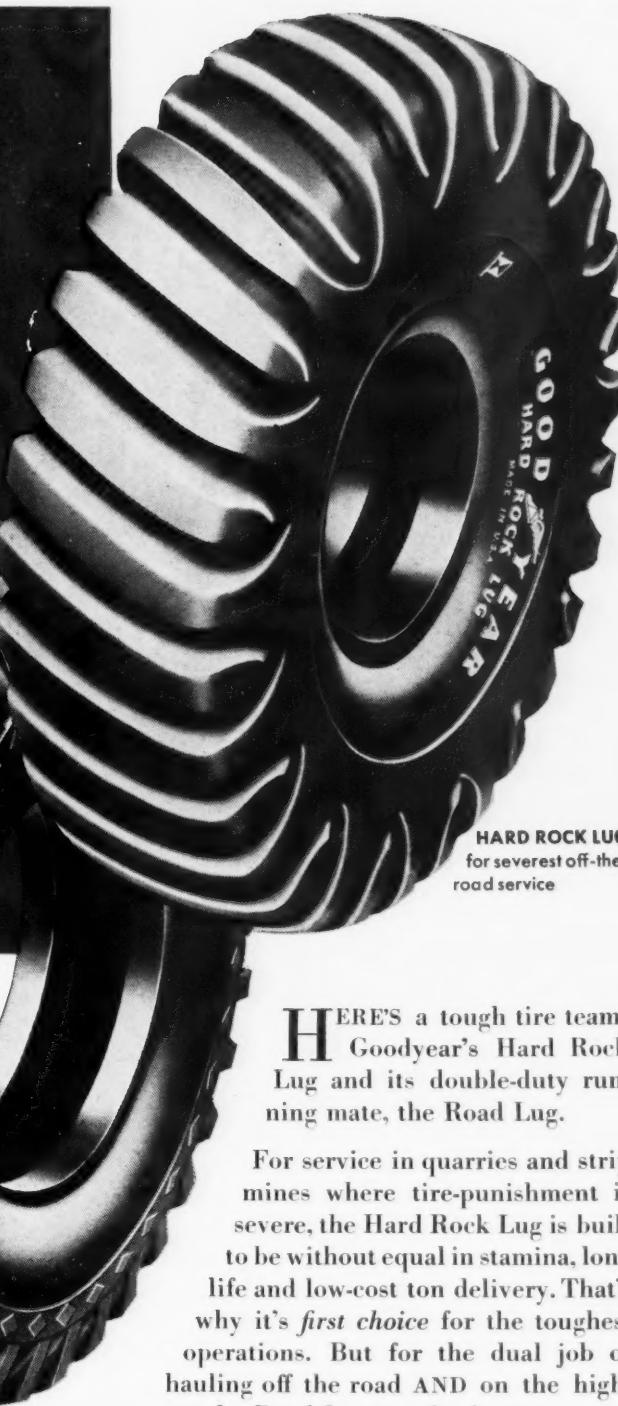
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ROAD LUG  
for dual service, off  
AND on the road



Road Lug—T.M. The Goodyear Tire & Rubber Company

BUY and SPECIFY  
**GOOD**  **YEAR**  
—it pays!



HARD ROCK LUG  
for severest off-the-road service

HERE'S a tough tire team: Goodyear's Hard Rock Lug and its double-duty running mate, the Road Lug.

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# GOOD YEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

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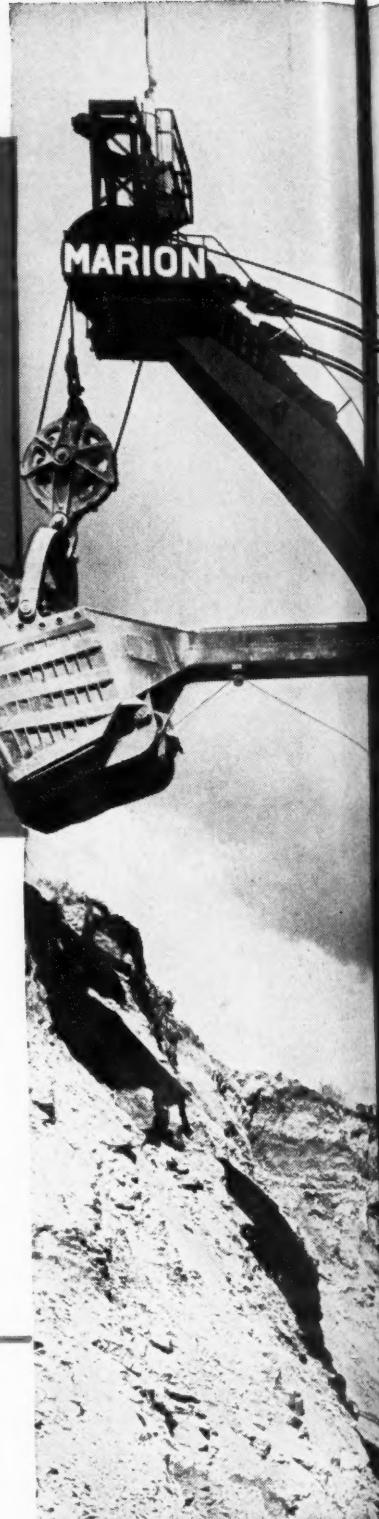
#### TEXACO MAINTENANCE LUBRICATION CHARTS

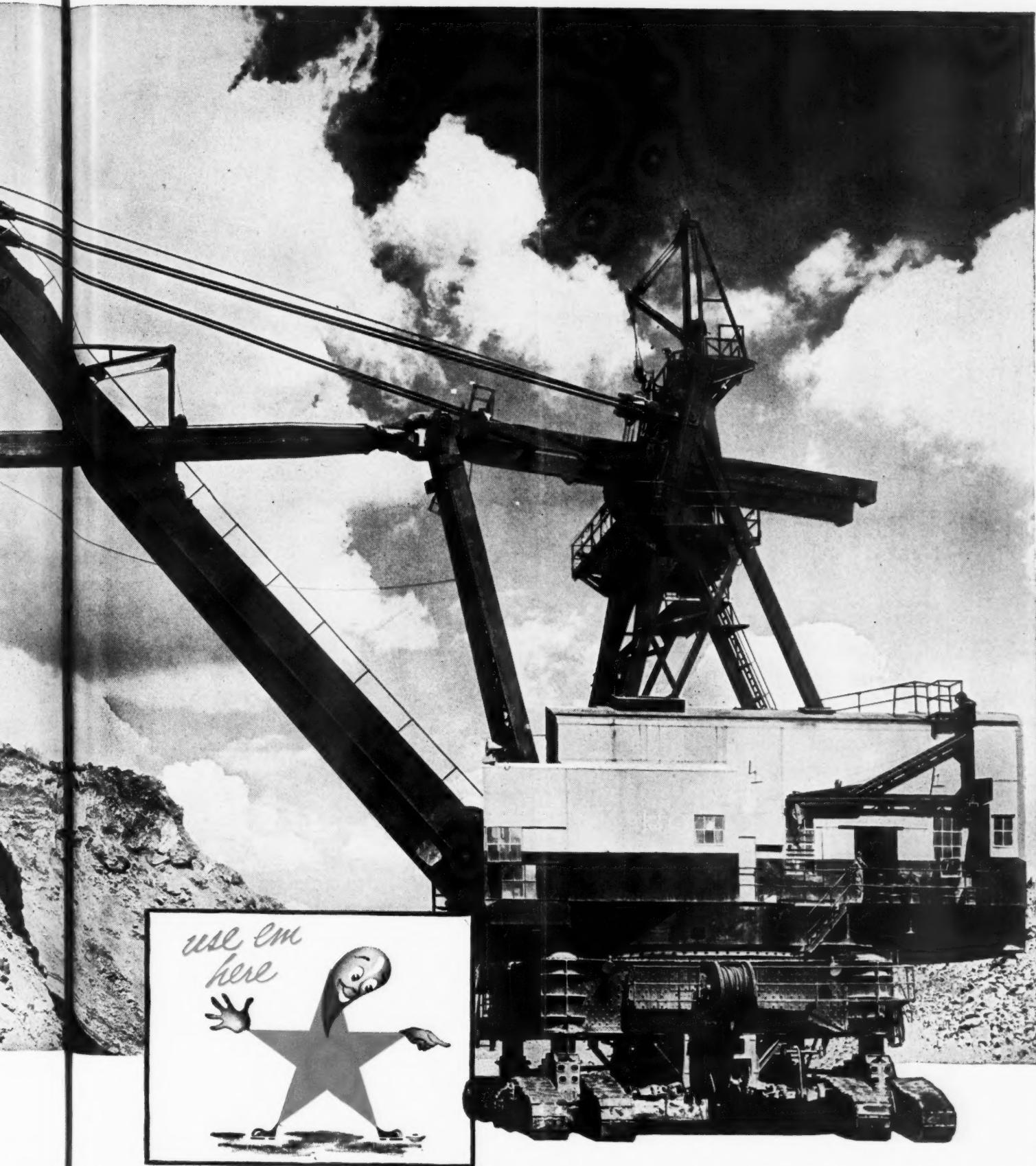
Leading manufacturers of underground mining machinery approve Texaco products for use on cutters, loaders, locomotives, etc., and have cooperated in preparing these charts. Charts show clearly where and when to use the proper Texaco lubricants. Order the charts you need by make and model of each machine.

Tune in . . .  
**TEXACO STAR THEATRE**  
presents the NEW  
**TONY MARTIN SHOW**  
every Sunday night.  
See newspaper for  
time and station.



# TEXACO LUBRICANTS





# For the Coal Mining Industry



No one need be around when two cars come together and automatically couple. The above photo was taken at the exact moment of coupling with the cam lever and chain still in motion.

A pull on the uncoupling lever and the two cars come apart. Because he doesn't have to go between the cars, there is little chance for this workman to become injured.

Looking out from Newkirk's water-level drift mouth toward the tipple. Cars are uncoupled here and go up a 16-1/4 degree incline to the dump. Recoupling upon impact is automatic on the empty track.



# Years WITHOUT A COUPLING ACCIDENT

O-B Automatic Couplers Help  
Produce Envious Safety Record  
at Newkirk Colliery

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## Ohio Brass

MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd.,  
Niagara Falls, Ontario



2758-AM  
O-B AUTOMATIC COUPLERS



... Designed Specifically  
for Mine Service



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*PUSH TONNAGE OUT FASTER!*



*In High  
Seams*

**11 BU moves up to**

**10 tons per minute**

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*In Low  
Seams*

**12 BU moves up to**

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Particularly adapted to conveyor loading, the 12BU has the Joy patented gathering mechanism which is driven by two motors, one for each arm. Its articulated chain conveyor may be swung horizontally 45° on either side of the center line.



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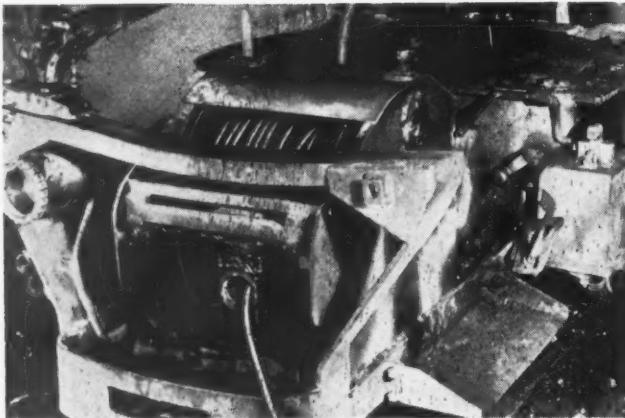
JOY DIVISION

JOY MANUFACTURING COMPANY

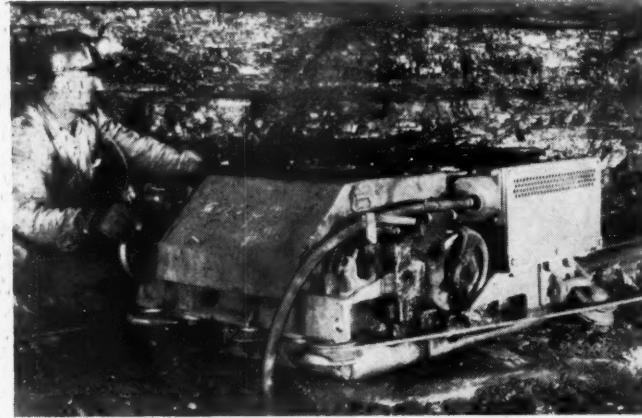
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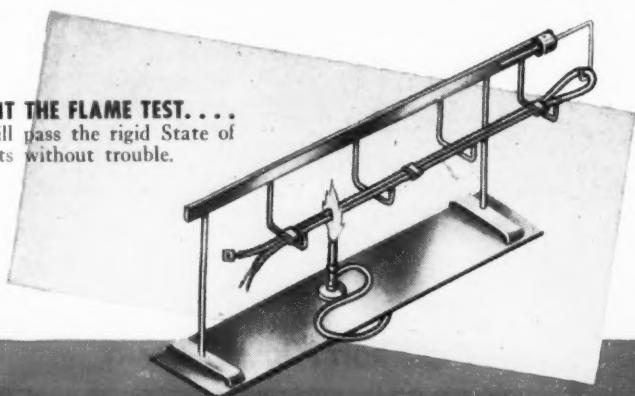


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**YOU CAN GIVE IT THE FLAME TEST. . . .**  
and Amerclad will pass the rigid State of Pennsylvania tests without trouble.



# safety . . .

## APPROVED U·S·S AMERCLAD CABLES



### NEW AMERCLAD TWIN PARALLEL MINING MACHINE CABLE WITH FLEXIBLE GROUND STRAND

This cable was especially designed to assure maximum safety to the men who work on or around rubber tired mining machines. It has a flexible ground strand between the two conductors which provides a positive ground for the machine. The ground strand also protects any workman who should accidentally penetrate the cable with a sharp tool.

### AMERCLAD TYPE GPS SHOVEL CABLE

Each of the three conductors is insulated with an extra-heavy wall of amerite 30% performance test rubber compound and is then covered with a rubber-filled tape. Over this is applied a type PS shielding tape of semi-conducting rubber which affords protection to workmen who are constantly handling the cable. The three ground wires in the valleys between conductors add further protection in case any conductor is damaged in operation. All interstices are filled with rubber compound and the assembly is covered with two layers of Neoprene rubber with a reinforcement of seine twine between them. This construction results in great flexibility, toughness and resistance to abrasion, oil, water and mine acids.

*Write for Amerclad Booklet*

Whatever the job, you can do it better and safer with U·S·S Amerclad Portable Power Cables. They are obtainable for low or high voltages in every needed size or type.

### AMERICAN STEEL & WIRE COMPANY

*Cleveland, Chicago and New York*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*  
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*  
United States Steel Export Company, New York

UNITED STATES STEEL



# U·S·S AMERCLAD CABLE

# Oxygen

...FRIEND  
OR  
FOE?



(Turbine Oil Oxidation Test)

Without oxygen, man cannot live. Yet, reaction to oxygen may shorten the service life and destroy the value of a lubricant!

Sinclair is ever alert to the importance of knowing exactly how oils will resist oxidation which can form gums and sludge detrimental to equipment performance.

No satisfactory, quick, short time oxidation test methods have yet been developed. Sinclair Research does not compromise. Some studies require continuous tests of 1000 hours. Others, performed with the apparatus above, are run for 100 hours or more.

This test — to assure consumers that breakdown and resultant costly repairs due to oxidation will be at a minimum — constitutes one safeguard against inferior product performance . . . just as all Sinclair Research is your assurance that every Sinclair Industrial Lubricant is the very highest in quality.

#### Sinclair Automotive Lubricants for Strip Mining

For Engines:  
**OPALINE MOTOR OIL**  
**OPALINE TBT MOTOR OIL**  
(For severe service)

**TENOL** (Heavy Duty — For Diesels)

For Gears:

**OPALINE GEAR LUBRICANTS**

For Chassis:

**OPALINE CHASSIS LUBRICANT**

For Wheel Bearings:

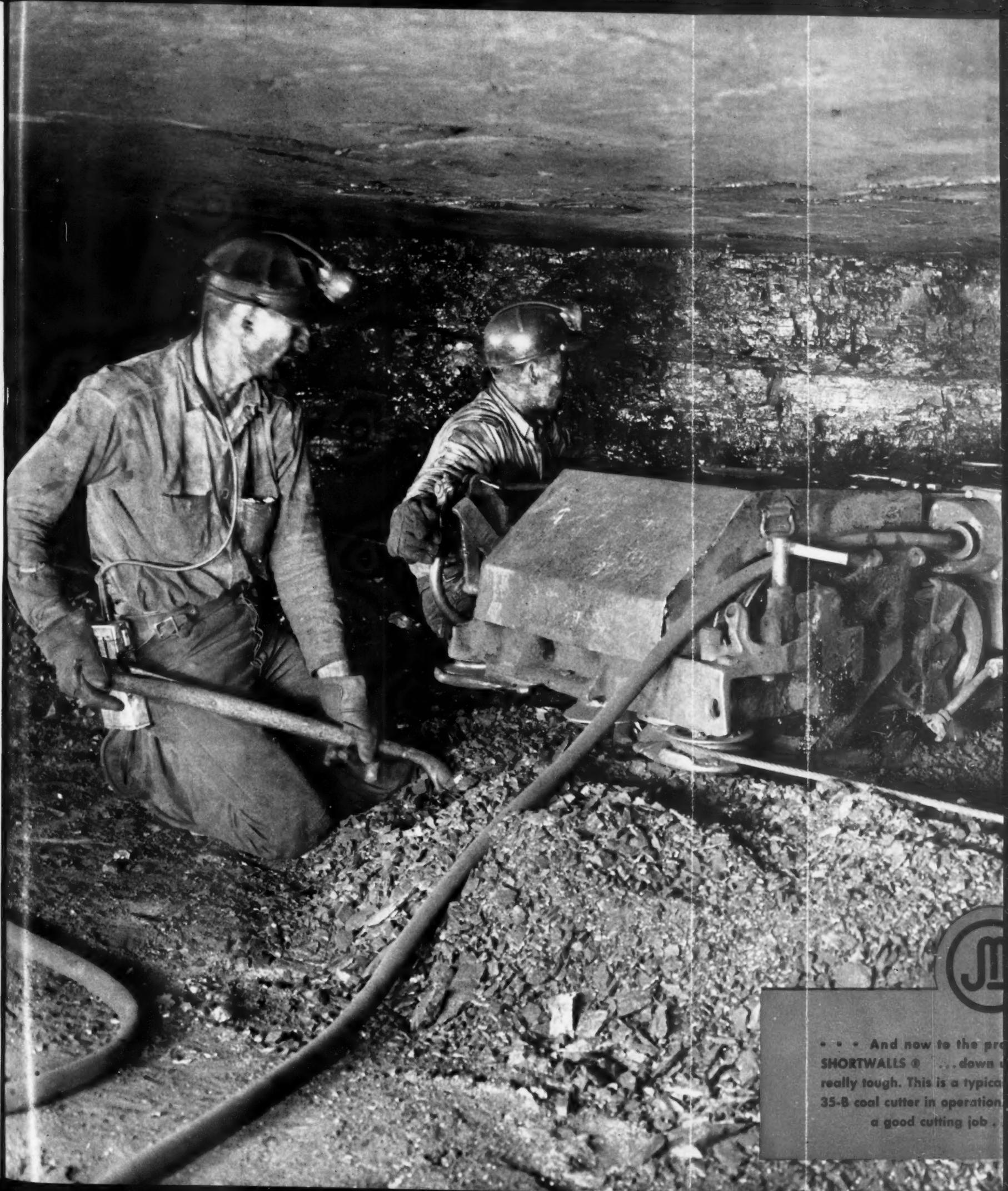
**SINCOLUBE**

SINCLAIR REFINING COMPANY • 630 FIFTH AVENUE, NEW YORK 20, N.Y.

**SINCLAIR**  
*Lubricants for Industry*

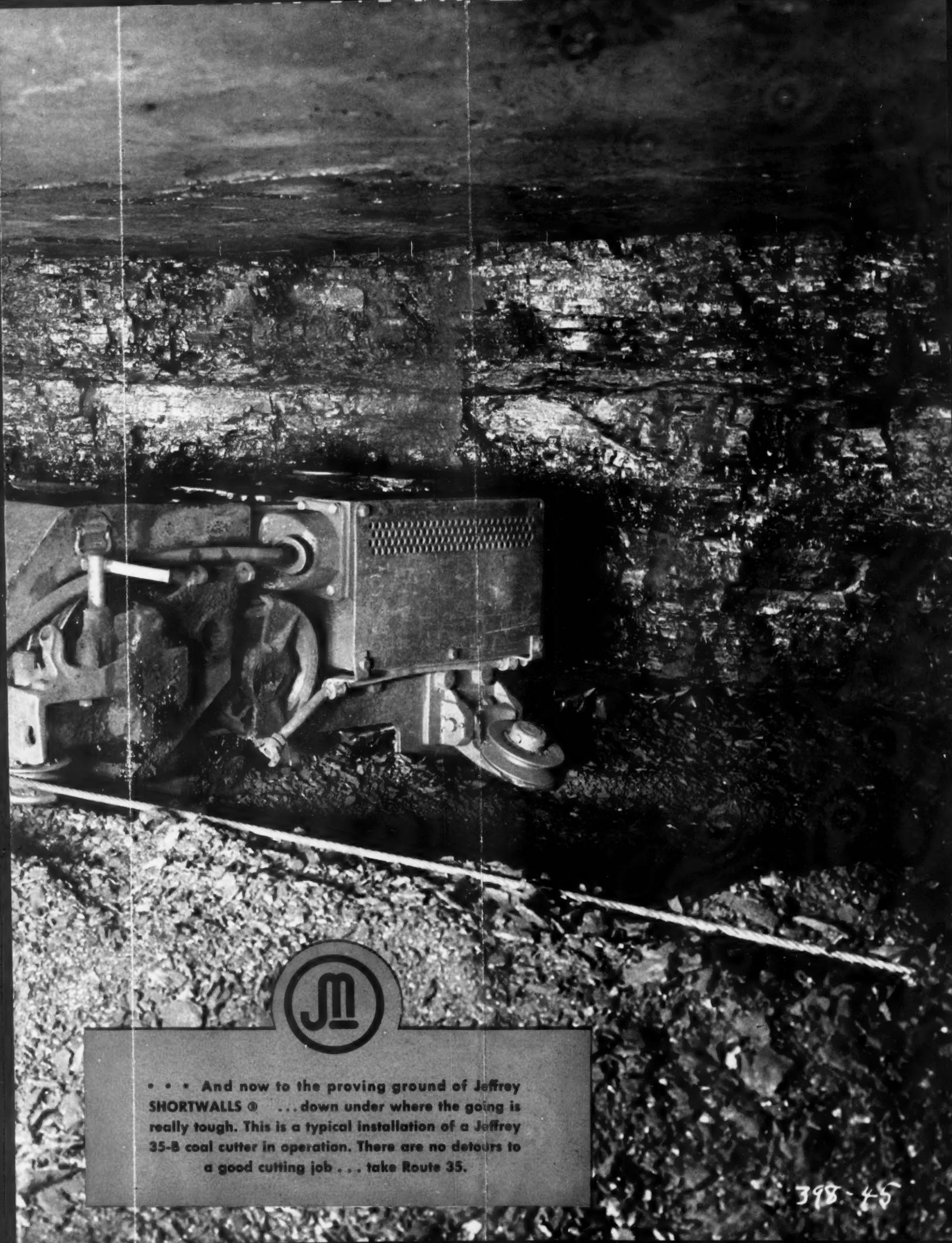
FINEST CRUDES + EXPERT RESEARCH

and MANUFACTURING CONTROL = OUTSTANDING PERFORMANCE



• • • And now to the pro  
**SHORTWALLS®** . . . down in  
really tough. This is a typical  
35-B coal cutter in operation.  
a good cutting job.





• • • And now to the proving ground of Jeffrey  
SHORTWALLS @ . . . down under where the going is  
really tough. This is a typical installation of a Jeffrey  
35-B coal cutter in operation. There are no detours to  
a good cutting job . . . take Route 35.

398-45

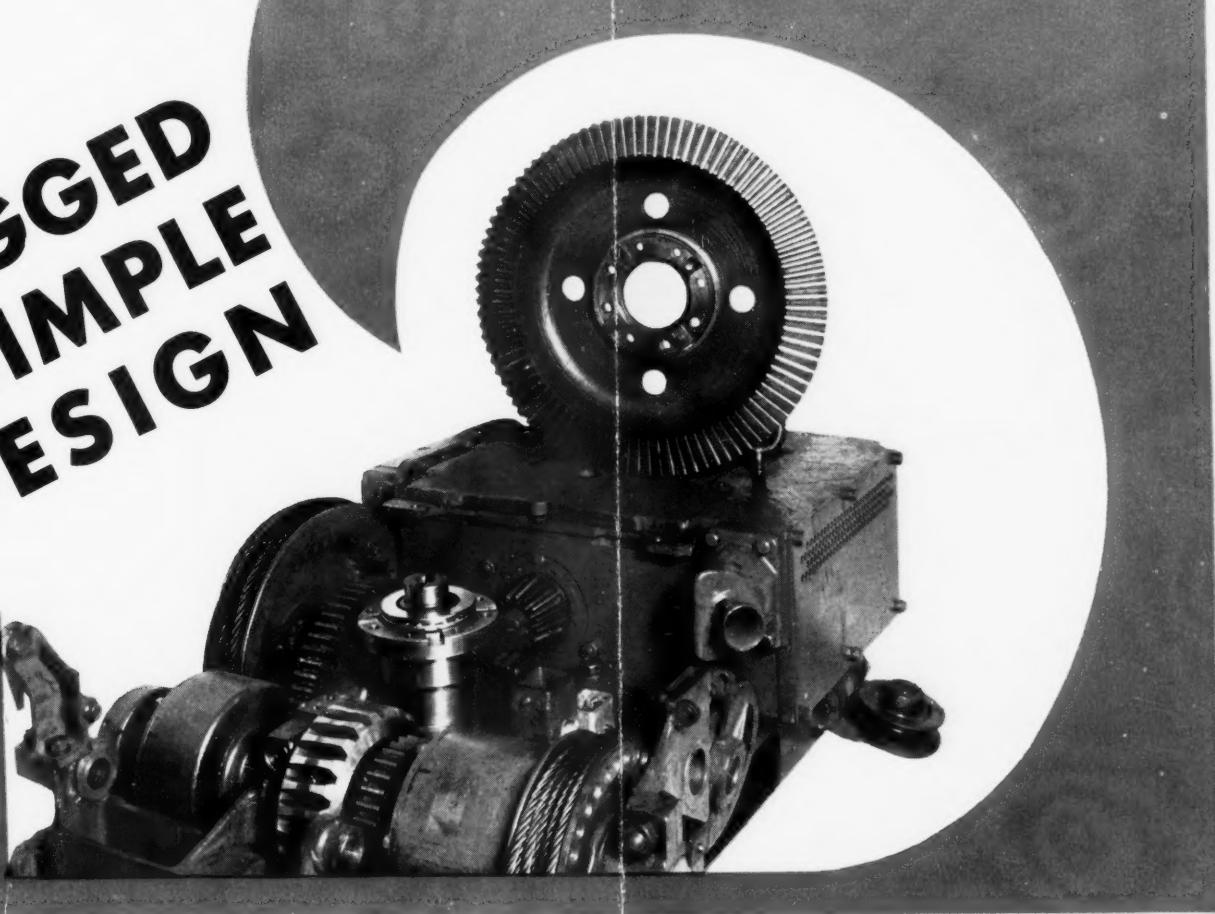


R

WIEFER EQUIPMENT

*A look inside reveals...*

**RUGGED  
-SIMPLE  
DESIGN**



## **JEFFREY 35-B COAL CUTTERS**

*have fewer gears — bigger gears —  
wear longer — cost less to maintain*

- Only one setting of the jacks required. The independent operation of the feed and handling mechanism permits the machine to be sumped and the cut across the face started with one setting of the jacks. In the Jeffrey SHORTWALL® Machines you have all the essential requirements for reliable performance and low maintenance. Note the simple and rugged design with few, slow moving parts and slow speed motor . . . all of which contribute to make Jeffrey SHORTWALLS® dependable and economical coal cutters.

**JEF  
F**

*Jeffrey sa*



# JEFFREY EQUIPMENT FOR COAL MINES

*Jeffrey service to Coal Mines means service to all industry*



**B**  
years —  
maintain

nt oper-  
chine to  
etting of  
have all  
w main-  
moving  
to make  
cutters.



**CUTTERS**

**BLOWERS**

**FANS**

**LOADERS**

**CONVEYORS**

**DRILLS  
AND DRILLING  
MACHINES**

**LOCOMOTIVES**

**THE JEFFREY MANUFACTURING COMPANY**

ESTABLISHED 1877  
NORTH STREET, COLUMBUS 16, OHIO

SALES OFFICES:  
Baltimore Chicago Denver Milwaukee  
Birmingham Cleveland Houston New York  
Boston Cincinnati Philadelphia  
Buffalo Detroit Huntington Pittsburgh  
St. Louis Salt Lake City  
Scranton  
Harrlan, Ky.  
Birmingham  
St. Louis

FOREIGN PLANTS:

British Jeffrey-Diamond, Ltd.  
Watfield, England  
Jeffrey Mfg. Company, Ltd.  
Montreal, Quebec  
Johannesburg, S. A.

Jeffrey Mfg. Company, Ltd.  
Montreal, Quebec  
Johannesburg, S. A.

SERVICE STATIONS:  
Pittsburgh Logan-Beeckley  
Harlan, Ky. W. Va.  
Birmingham Scranton  
St. Louis

# TWO YEARS OF USE PROVE SUPREMACY!

## ATLAS ROCKMASTER

*The original milli-second delay blasting system*

### Gives 4 Outstanding Results

All over the country blasters are recommending Rockmaster for new blasting efficiency. They claim that it yields more rock ready for the shovel, increases fragmentation, reduces "back break," eliminates complaints about noise and vibration even when more holes are fired. They ought to know what Rockmaster will do. *They've been using it since 1945!*

In quarries, strip pits, on construction work, even underground in many cases, Rockmaster has increased production by as much as 30 percent!

Part of the Rockmaster system is a split-second delay that enables you to time the delay elements of your shots within thousandths of a second—a degree of control heretofore impossible. In 1946 alone, over 2,000,000 blasting detonators which control this delay have been sold!

Yes, time has proved that Rockmaster *gives results*—the kind of results that really count. But be sure you get the genuine, original Rockmaster. Talk over your problems with the Atlas representative. He's had two years of experience in split-second delay blasting, giving a background of know-how that cannot be gained in any other way.

*Less Bark*



*More Bite*

- 1 **MORE ROCK READY FOR SHOVEL**
- 2 **BETTER FRAGMENTATION**  
Less secondary blasting.  
Shovel efficiency increased as much as 30%.
- 3 **FAR LESS "BACK BREAK"**  
behind your shots.
- 4 **MINIMUM NOISE AND VIBRATION**  
even though more holes are fired.

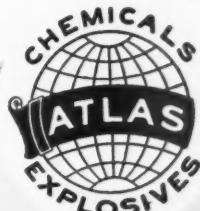
"ROCKMASTER"—Trade Mark

# ATLAS

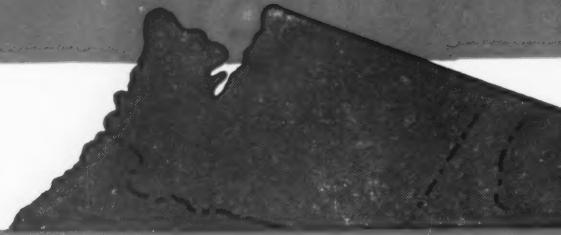
## EXPLOSIVES

*"Everything for Blasting"*

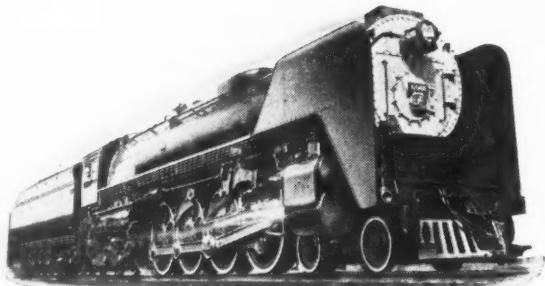
ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco



# COAL CONSUMPTION REALLY



## "CENTRAL" Plans ahead with Coal



### POST-WAR POWER

New, mighty NIAGARAS are recent additions to Central's fleet of 3,600 steam and electric locomotives. Their 6,000 horsepower smoothly handles either the longest and heaviest freight or New York Central's fast passenger trains.



### LABORATORY ON WHEELS

These 16 automatic pens in a Dynamometer test car record on a moving chart every detail of performance data as Central's engineers put this new NIAGARA through its paces on a week-long trial run.



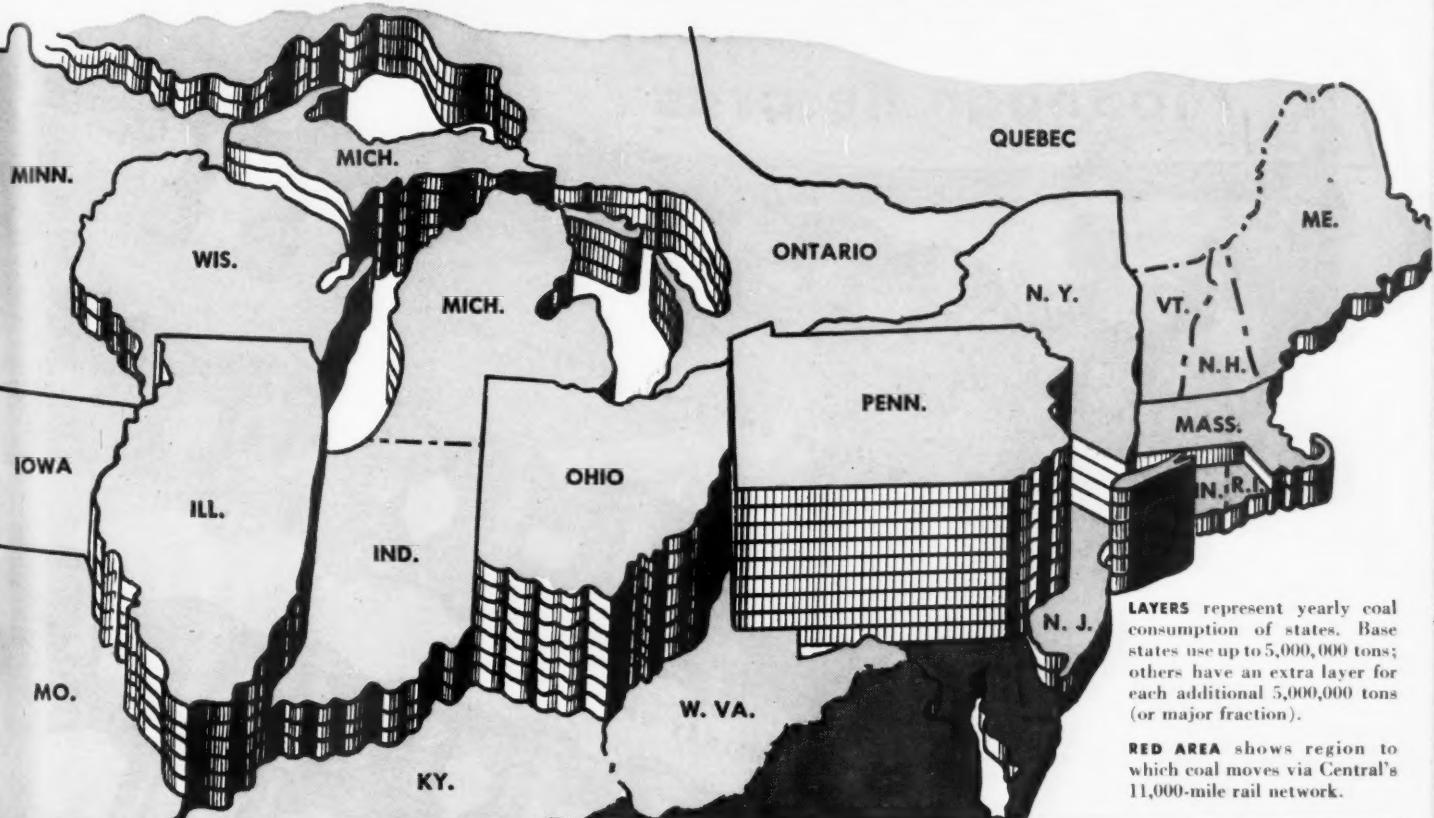
### LOOKING AHEAD IN COAL

Central joins coal industry in investing hundreds of thousands of dollars in research to perfect coal-burning turbine-type engines, strengthening coal's position as railroad motive power.

# NEW YORK CENTRAL

The Water Level  
Route

# "STACKS UP" in New York Central's Area



## COAL QUIZ

DO YOU KNOW THE ANSWERS to these questions about the coal market in the states served directly by New York Central?

1. How many of the 10 largest U.S. cities are on New York Central?  
**3, 4, 5, 6, 7**
2. The states served by New York Central produce what percent of the nation's steel?  
**26% 48% 63% 81%**
3. How much of all U.S. retail coal is sold in the New York Central area?  
**23% 36% 47% 65%**
4. How much of the nation's 359,630,866-ton bituminous coal consumption is used by these "Central" states?  
**36% 49% 61% 71%**

### ANSWERS:

1. Of the largest U.S. cities with their enormous consumption of coal for heat, light, power and industry, 7 out of 10 are served directly by New York Central.
2. 81% of the nation's steel production . . . in fact almost  $\frac{1}{3}$  of all industrial production . . . contributes to making the "Central" area America's top coal market.
3. The homes in New York Central territory, located in less than  $\frac{1}{4}$  of the 48 states, burn 47% of all coal sold at retail in the nation.
4. The 11 states served directly by Central's 11,000-mile rail network account for 71% of the nation's bituminous coal consumption . . . more than all the other 37 states combined.

NEW YORK  
CENTRAL  
SYSTEM

ever

# WHITNEY CHAINS

**Help Set and Maintain  
Tonnage Records**



Put new life into your equipment by replacing worn, inefficient loader, conveyor and drive chains with Whitney Chains. These time-tested chains are built to take the use and abuse of the severest service. Precision made of heat-treated alloy steel, they have ample strength and toughness to resist shock loads without breakage. They stand up under continuous long runs . . . keep equipment working by delivering full-rated machine capacity.

Remember too, that accurately made Whitney Cut Tooth Sprockets play an important part in overall Drive efficiency . . . are accurately designed to insure smooth operation and long life.

For higher tonnage with less down time, it will pay you to standardize on Whitney. See the nearest distributor in your territory or write:

**THE WHITNEY CHAIN & MANUFACTURING COMPANY**

*Your Assurance of Proven Power Transmission and Conveying Since 1896*

**HARTFORD 2, CONNECTICUT**



We didn't hang an information sign on the Simplex booth during the recent Coal Show, but we did want to be an "information bureau" — and that's just what we were!

Mining men with hundreds of questions about insulated cords and cables came to see us. We were more than glad to give them the information they needed and to show them how TIREX cords and cables, ANHYDREX cables, Simplex bore hole cables, and Anhydoprene wires are designed to meet their own individual needs and the needs of all types of mining service.

But we knew at the time that wiring problems wouldn't stop with the show; that new and difficult questions would constantly be coming up. And so, what we said then we emphasize now:

Regardless of what your requirements may be, don't hesitate to call on Simplex for assistance. A thorough study of your specifications will be made and a sound recommendation rendered without any obligation.

*Simplex-Tirex*

**SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.**

# The **SIDE** of a V-BELT

is the **ONLY** Part that  
*Even Touches the Pulley*

Naturally, it **GETS** the **WEAR!**



Diagram of V-Belt  
in Sheave Groove

The moment you look at a V-belt in its sheave, you see that the *sides* are the only part that ever *touch* the pulley. The *sides* do all the gripping—they get *all the wear* against the sheave groove wall. The sides *pick up* the load. They transmit that load to the belt as a whole. And then, once more, the sides—and the sides alone—take hold of the driven pulley and deliver the power to it.

No wonder you have always noticed that the sidewall of the ordinary V-Belt is the part that *wears out first*.

## Now See How the *Patented* **CONCAVE SIDE** \*REDUCES Sidewall Wear—Lengthens Belt Life!

Clearly, since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt. The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the *middle* of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.

### \*More Important NOW That Gates **SUPER V-Belts** are Available

Now that Gates **SPECIALIZED** Research has resulted in Super V-Belts capable of carrying much heavier loads—up to 40% *higher horse-power ratings* in some cases—the sidewall of the belt is called upon to do even *more work* in transmitting these heavier loads to the pulley. Naturally, with heavier loading on the sidewall, the life-prolonging Concave Side is more important NOW than ever before!

**THE GATES RUBBER COMPANY**  
DENVER, U. S. A.  
"World's Largest Maker of V-Belts"

**GATES VULCO ROPE DRIVES**  
IN ALL INDUSTRIAL CENTERS

Engineering Offices  
and Jobber Stocks

of the U. S. and  
71 Foreign Countries



U. S. PAT. OFF.

THE MARK OF  
SPECIALIZED RESEARCH

The  
CONCAVE SIDE  
is a **GATES PATENT**

Straight Sided  
V-Belt

Fig. 1

How Straight Sided  
V-Belt Bulges  
When Bending Around  
Its Pulley



Fig. 1-A

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt  
with Patented  
Concave Sidewall



Fig. 2

Showing How Concave  
Side of Gates V-Belt  
Straightens to Make Perfect  
Fit in Sheave Groove  
When Belt Is Bending  
Over Pulley



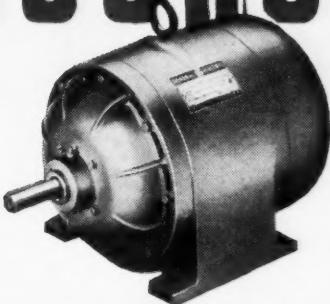
Fig. 2-A

No Bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt.

477

# 5 BILLION MOTOR HOURS

PROVE YOU  
CAN'T BEAT



## TRI/CLAD

### EXTRA PROTECTION

Announcement of the Tri-Clad motor, back in 1940, ushered in a new concept of general-purpose motor design. Substantially increased horsepower-per-frame-size was one feature. Smarter appearance was another. But what really sold more than a million Tri-Clad motors is the *extra protection* we built into them. Figured conservatively, they have delivered more than 5 billion hours of service.

Today, with the "family" including dripproof motors, vertical motors, gear-motors, capacitor-motors, and totally enclosed motors, the Tri-Clad motor is, more than ever, the motor that means basic protection, dependable performance, and minimum upkeep. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

#### EXTRA PROTECTION... AGAINST PHYSICAL DAMAGE!

Rigid cast-iron frame and end shields protect vital parts from external abuse and prevent resonance. Because they're not at the mercy of a coat of paint, they strongly resist chemical attack and dampness. Cast iron also gives you tight, *metal-to-metal* fits between end shields and frame.

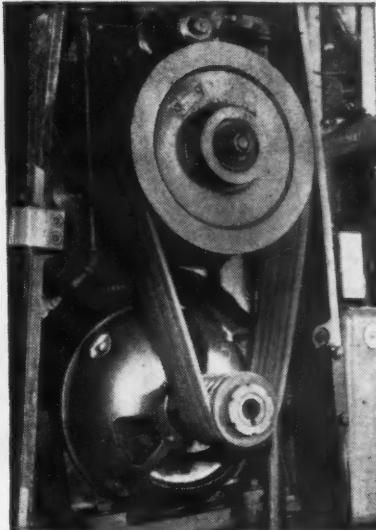
#### EXTRA PROTECTION... AGAINST ELECTRICAL BREAKDOWN!

Windings of Formex\* wire, together with improved insulating materials, reduce the chances of electrical failure. Heat is dissipated quickly — motor stays young for years and years.

#### EXTRA PROTECTION... AGAINST OPERATING WEAR AND TEAR!

Bearing design affords longer life, greater capacity, improved lubrication features. Bearing seals retain lubricant, keep out dirt. One-piece, cast-aluminum rotor is practically indestructible.

\*Trade-mark reg. U.S. Pat. Off.



#### 5 YEARS IN "SOLITARY"

Many machine tools in the Bell Aircraft plant at Buffalo have pioneer Tri-Clad motors tucked away inside. The result is a sleek exterior for the machine and valuable floor space saved. During the war, when time was short and uninterrupted protection was of utmost importance, these motors gave dependable service, demanding only a minimum of maintenance and inspection. The Tri-Clad motor you see here driving a milling machine has not been removed for five years. It has done its job faithfully despite the strain of a 3-shift, 7-day work schedule, and along with 200 other Tri-Clad motors in the Bell plant, gives every sign of staying on the job indefinitely.

#### NOW—PEAK MOTOR TOUGHNESS

The Tri-Clad totally enclosed, fan-cooled motor is designed for use in adverse atmospheres — in iron dust, out-of-doors, in hazardous areas, and chemical atmospheres. It gives you these important construction features:

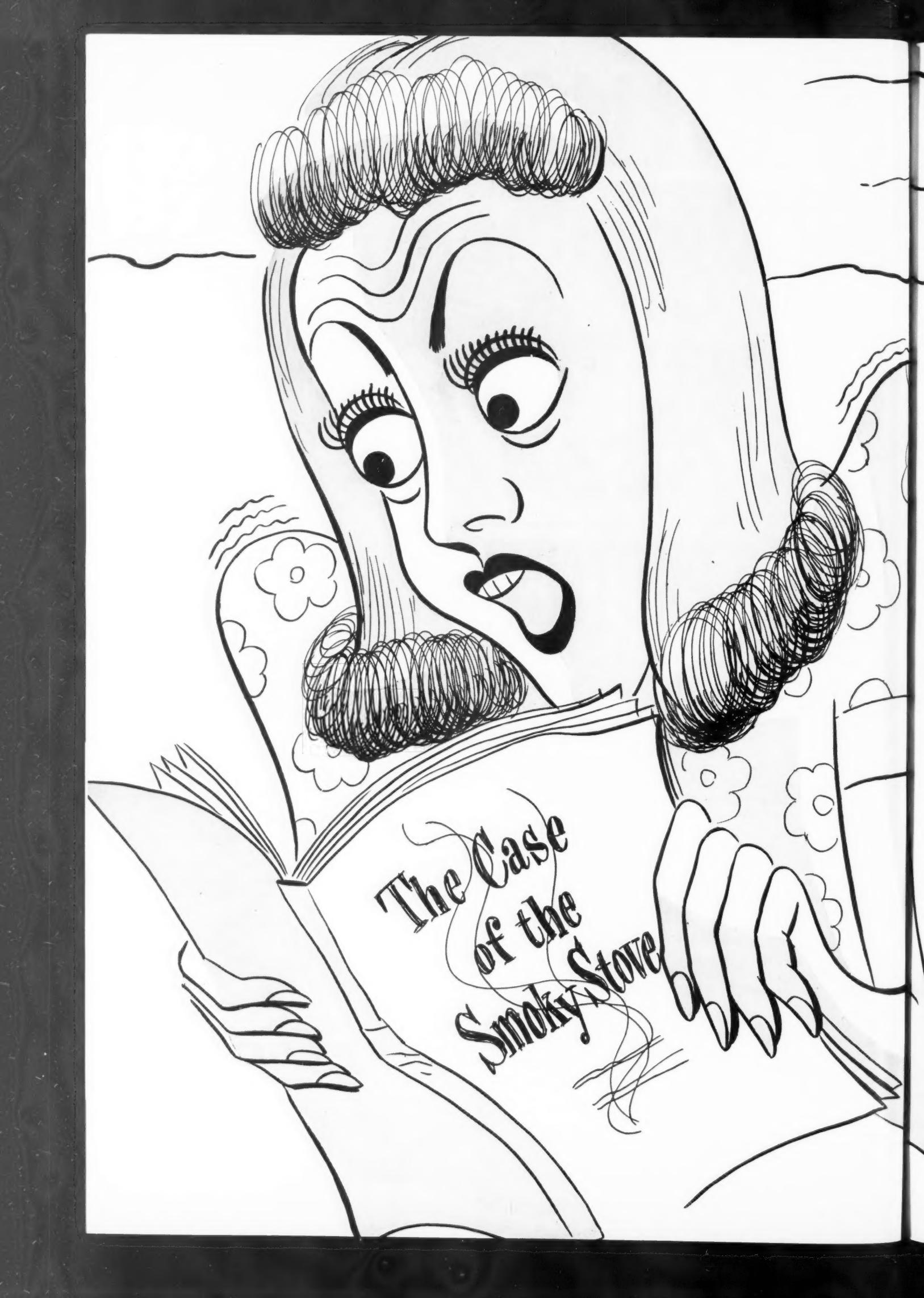
- A cast-iron, double-wall frame which completely encloses and protects windings and punchings.
- A nonshrinking compound around motor leads which protects motor interior from dust and moisture.
- A rotating labyrinth seal which further protects the motor interior from damage by foreign matter.



**TRI/CLAD**  
REG U.S. PAT OFF  
**MOTORS**

**GENERAL ELECTRIC**





The Case  
of the  
Smoky Stove

# Murder Story!

**I**N TOO MANY American homes the business of coal dealers is being murdered by smoky stoves.

The fault is usually with the stoves—but COAL gets the blame. Progressive stove manufacturers as well as the coal industry itself feel that the burden of this damaging defect in stove design has been borne long enough.

Under direction of the coal industry's own research organization stoves are being developed that will burn a wide range of bituminous coal with high efficiency and without smoke. Production of these stoves is starting this year.

### *A Constructive Program*

Coal, more than any other fuel, enables the average family to afford plenty of heat—

have all they want. Older people especially enjoy, and need, the steady abundance of heat yielded by coal.

The coal industry is resolved that means shall be provided enabling householders to save money by burning coal—smokelessly—in full enjoyment of clean, automatic, abundant heat. Every coal producer, carrier, distributor and retailer should help support this movement to "keep the home fires burning coal."

### *The Chesapeake & Ohio is Active in This Work*

The Chesapeake & Ohio is active in this work, is helping to finance the researches which evolved these new stoves and other projects of importance to the future of coal.

Chesapeake & Ohio Railway

*Keep the home fires burning coal*

# How to put King Coal on the carpet



**Coal is your servant.** But below the ground it reigns supreme. The trick is to make King Coal abdicate his underground domain.

In some mines it's done with mule cars that carry the coal out. For each load they take out, they have to return the same distance—empty! This is also true of power-driven cars. Both methods take up valuable space... eat up man-hours... cost time and money.

Hewitt-Robins engineers knew that something would have to be done. Coal mining couldn't wait for mules!

Their answer was a conveyor—an endless "carpet" of rubber belting that moves on rollers. It operates so efficiently it has *put King Coal on the carpet*—for good!

It's the Robins Underground Mine Conveyor... "Job-Engineered" to move coal as it is mined. It can reach deep into tunnels half the height of a man and bring out tons of coal every minute.

Its tough Ajax Underground Conveyor Belting, made by Hewitt, withstands abrasion. It resists mildew and moisture. It wears longer because it provides more rubber where it is needed.

The Robins Underground Mine Conveyor is one of many products "Job-Engineered" by Hewitt-Robins to solve materials handling problems. It's the result of combined operations by Hewitt Rubber and Robins Conveyors.

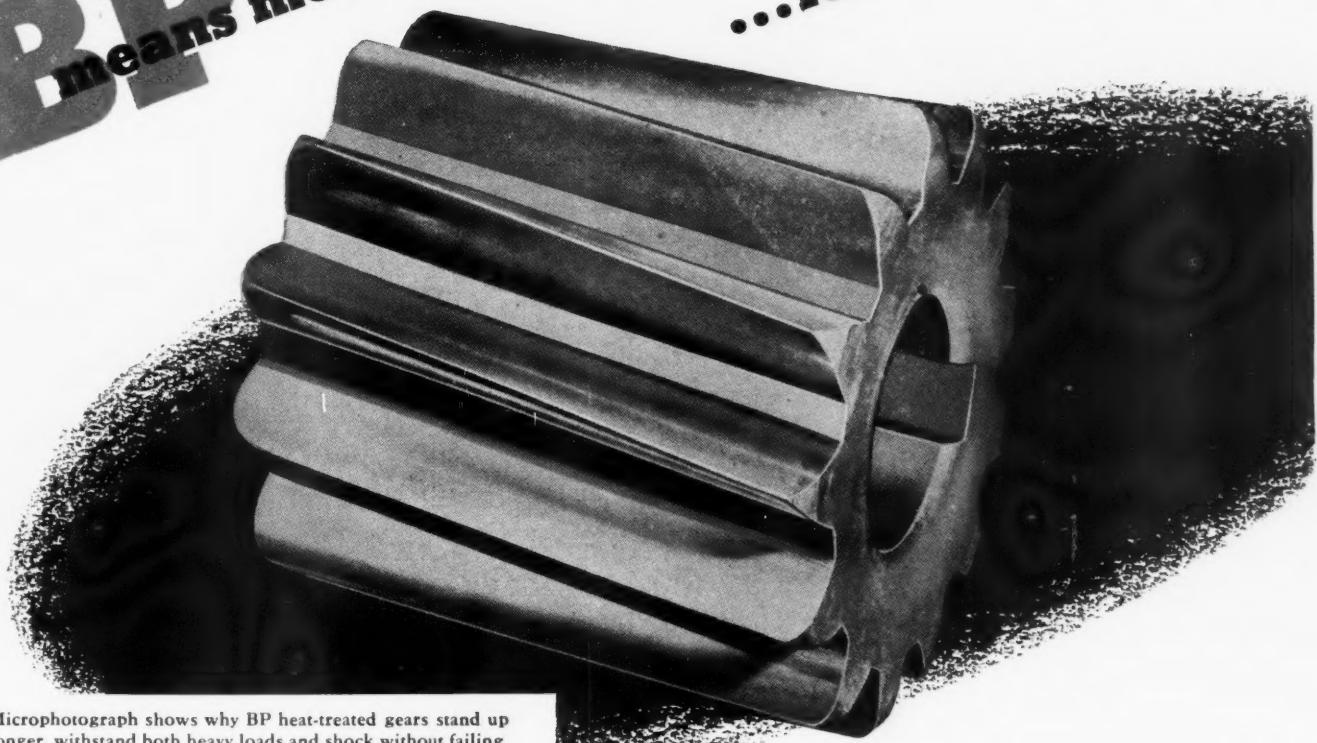
No wonder the Robins Underground Mine Conveyor assures more efficient, more economical mining operations. You get a tough, flexible "carpet" to carry extra tons of coal. And you get a strong, sturdy conveyor to move the coal.

Why not find out how a Robins Mine Conveyor can help you? Write Robins for details.

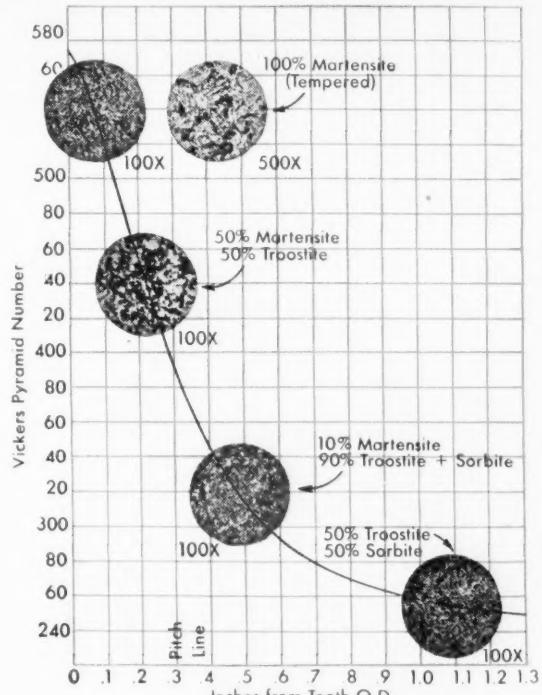


**ROBINS**  
Underground Mine Conveyor

**BP** means more miles per dollar...  
...for example



Microphotograph shows why BP heat-treated gears stand up longer, withstand both heavy loads and shock without failing.



\* The example is the record of this BP heat-treated gear in transportation service . . . 14 years of continuous operation! And it's ready to go back to work.

This kind of service means money in the bank for any mine operator, because it points the way to more trips per dollar for mine locomotives through use of the exclusive Westinghouse BP heat-treated gears. The chart and microphotographs illustrate why BP heat-treated gears stand up better, longer, are unaffected by both heavy loads and severe shock in mining service.

BP processing gives you gears with graduated hardness from surface through the root of the gear tooth . . . gives you the combination you need for mine service—strength, toughness and high resistance to abrasion.

Get the facts from your nearest Westinghouse office on the way BP heat-treated gears can contribute to your operating economy. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-07254



**Westinghouse**  
PLANTS IN 25 CITIES... OFFICES EVERYWHERE

**BP** Gears

MAKES MORE

FOR MORE MINES

*than any other kind*

The largest selling bits for use with mechanical coal cutting machines are Bowdil Bits. Such popularity is deserved by performance, long life and low cost operation in a growing list of mines throughout the world.

Made of special alloy steel and heat treated by the most modern methods to hardnesses best suited to your cutting conditions, Bowdil Bits are available in special shapes, cutting face contours and clearance angles to fit your needs.

A nearby Bowdil Service Man or Representative will be pleased to give you further information. Write for our latest bulletins on Bowdil Mining products.



**BOWDIL**

COAL CUTTING EQUIPMENT  
CANTON OHIO

# HYDRAULICS

*make Steering Easier on*  
**JOY Shuttle Cars**



6-SC  
for  
W Seams

Height 31", low wide loading end, capacity  
3 tons. Fixed discharge—low or high.

**Four Wheel Drive**

•  
**Four Wheel  
Hydraulic Steering**

•  
**Makes 90° turns easily**  
*Consult a Joy Engineer*

5-SC  
for  
High Seams

Right or left hand drive is optional on the 5-SC  
Capacity up to 8 tons; hydraulically elevate  
discharge end available on cable reel model

JOY DIVISION

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BLDG., PITTSBURGH, PA.

# PERFECT

## *for easier handling*

Holding handle is located above the center of gravity. Balanced distribution of weight assures easier handling and provides simplified control of the stoper.

Extra-long chuck has extra large bearing surface for proper alignment and longer life.

To prevent the entrance of dirt or water, air is fed to the chuck automatically.

A double tube is used. Air flow is automatically maintained in the outer tube. The inner tube is for water.

Side rod nuts located at feed leg collar position. The feed cylinder can be removed without disturbing the assembly of the front head, cylinder and back head.

Control of the powerful feed leg is new and more positive.

Throttle handle is raised to start the stoper, lowered to stop it. Falling rock cannot start the 600.

Powerful rotation. Oversize rifle bar and large bronze rifle nut assures added tool life and very powerful rotation.

### Extra Job-Tested Features:

A built-in oil reservoir and a force feed system in which the correct amount of lubricant is metered out by a plunger gives the most efficient type of lubrication to all

parts, including the chuck. Thor's famous air valve has large bearing areas, extreme light weight and short travel. Results are faster action and longer life.

# BALANCE...

on the job!

THE NEW

*Thor*

## STOPER ROCK DRILL MODEL 600



*Outstanding* for drilling speed and handling ease! That was the verdict for the new Thor "600" Stopper after rugged field tests. *Perfect balance*—providing a new ease in handling, plus positive control in any position—scored the "600" with drill runners. *Speed*—faster penetration . . . more footage per shift because of increased handling efficiency—scored with operators. Try the "600" yourself—call your nearest Thor branch for a demonstration.

### INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. Jackson Boulevard, Chicago 6, Illinois

Export Division: 330 West 42nd St., New York 18, New York

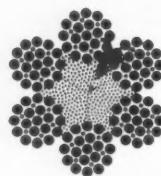
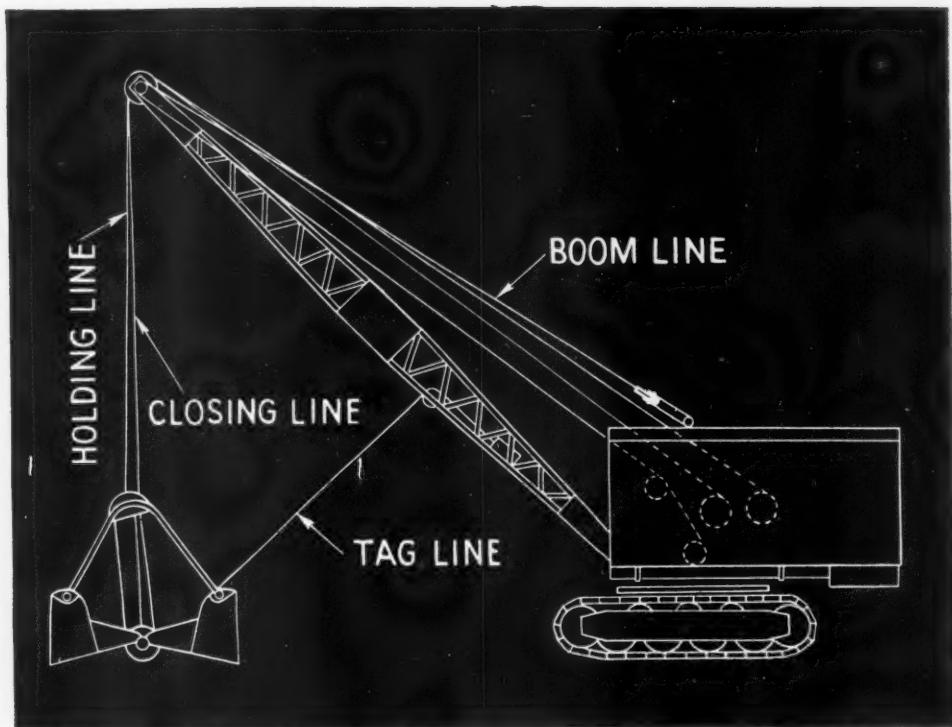
Birmingham	Boston	Buffalo	Cincinnati	Cleveland	Denver	Detroit
Houston	Los Angeles	Milwaukee	New York	Philadelphia	Pittsburgh	St. Louis
St. Paul	Salt Lake City	San Francisco	Toronto, Canada	Sao Paulo, Brazil	London, England	

*Thor* **PORTABLE POWER**  
**TOOLS**

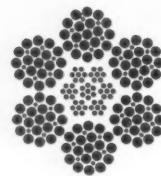
PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

COAL AGE • July, 1947

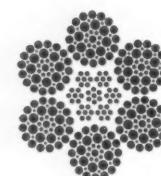
## Follow this guide in buying Ropes for Clamshell Cranes



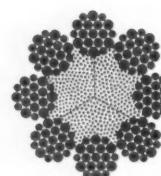
TYPE W  
fiber core



TYPE W  
independent  
wire rope core



6 x 37 TYPE Q  
independent  
wire rope core



8 x 19 WARRINGTON  
fiber core

Each rope on a clamshell crane has a specialized job, and your choice of lines has a direct bearing on rope life and performance. Bethlehem suggests that you use the following as a guide when considering wire rope for clamshells.

**HOLDING LINES** encounter relatively little wear or crushing. Bethlehem's 6 x 19 Type W Purple Strand with regular lay and fiber core is widely used. Form-Set (preformed) often specified.

**CLOSING LINES** are often subjected to severe bending and crushing. Good ropes for this service are the 6 x 19 Type W and the 6 x 37, choice depending upon the type of bucket. To help resist crushing, independent wire rope core may be required. We recommend Purple Strand grade, regular lay, Form-Set (preformed).

**BOOM LINES** are rarely subject to heavy wear. A Purple Strand 6 x 19 Type W rope, regular lay, will do a good job for you here. A fiber core is often used, but independent wire rope core gives added protection against crushing.

**TAG LINES** need unusual flexibility and elasticity. Generally plow steel rope with regular lay and fiber core is used. 8 x 19 is suggested for small cranes; 6 x 19 Type W for large ones.

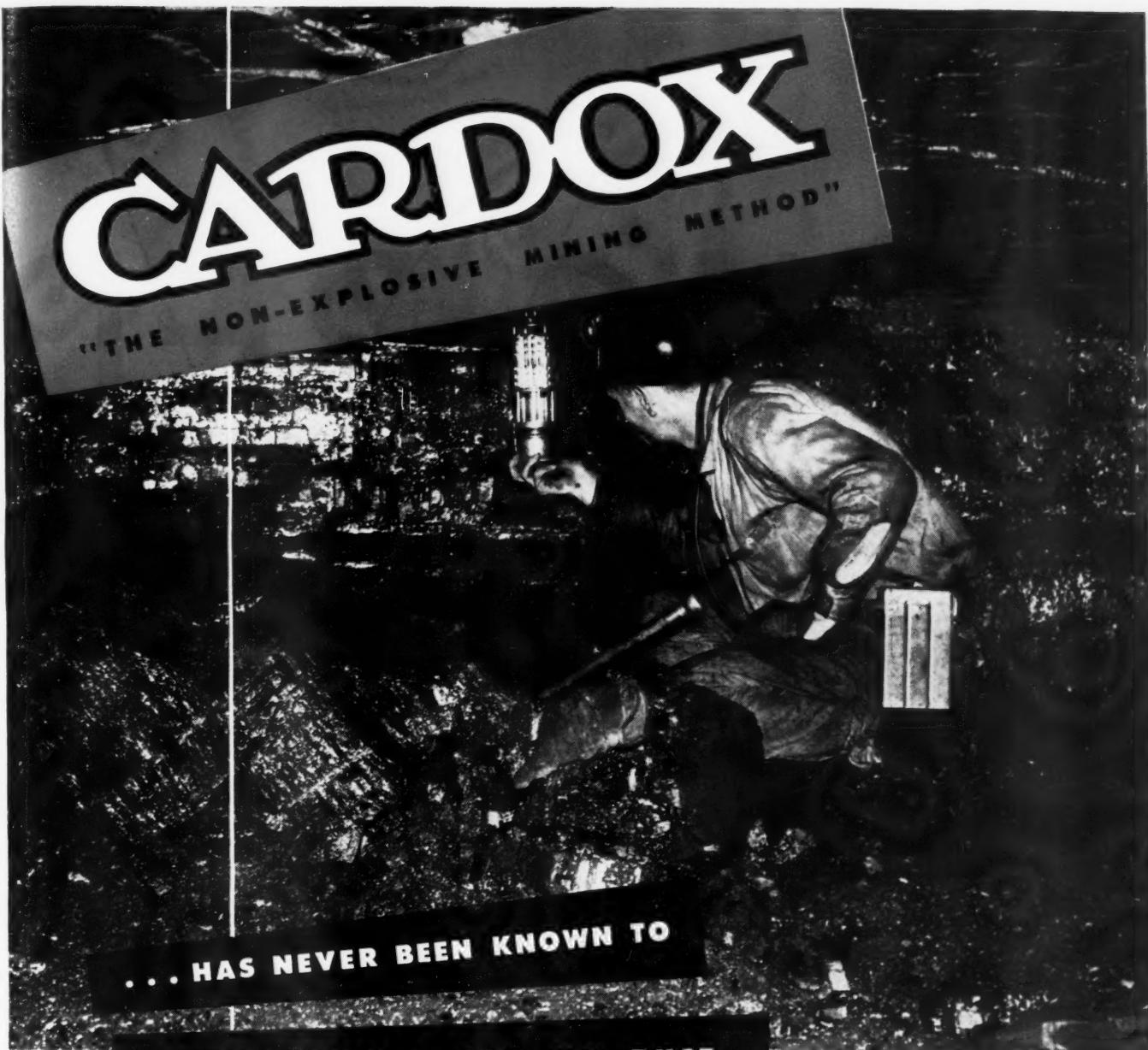
If further details are required, ask for the services of a Bethlehem engineer. He'll be glad to help with your wire-rope problems, at no cost to you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by  
Bethlehem Pacific Coast Steel Corporation



**When you think WIRE ROPE . . . think BETHLEHEM**



... HAS NEVER BEEN KNOWN TO

IGNITE EITHER GAS OR DUST

CARDOX mining adds to the advantages of increased realization, and decreased degradation the assurance of maximum safety throughout face preparation.

The mild heaving, shearing action of CARDOX reduces roof-failure hazards — squares up both face and rib so that dangers resulting from overhanging face in high seams are greatly reduced. The discharge of a CARDOX Tube has never been known to ignite either gas or dust — although CARDOX is widely used in gassy and dusty mines.

Carbon dioxide, which provides the powerful heaving action used by CARDOX to dislodge coal, is one of the fastest and most effective fire extinguishing mediums known. It penetrates where water or rock dust cannot reach, it can be used safely to extinguish electrical fires, and it will not damage machinery. CARDOX Tubes are in fact emergency fire extinguishers readily available in all mines where CARDOX is used.

Write for full details on free demonstration of CARDOX safety and profit features in your own mine.

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS

# TAILORED TO mine-measure

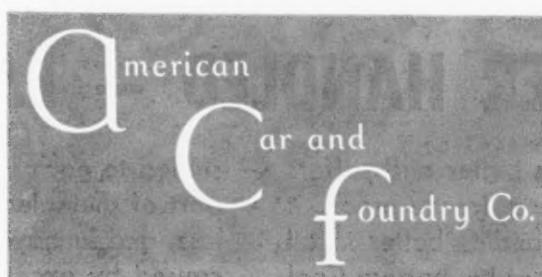


ELKHORN  
SEWELL  
PITTSTON  
PITTSBURGH  
ALMA  
RED ASH  
ANTHRACITE  
DUNMORE  
POCAHONTAS  
HAZARD  
FIVE BLOCK  
BITUMINOUS  
ISLAND CREEK  
CEDAR GROVE  
HARLAN  
THACKER

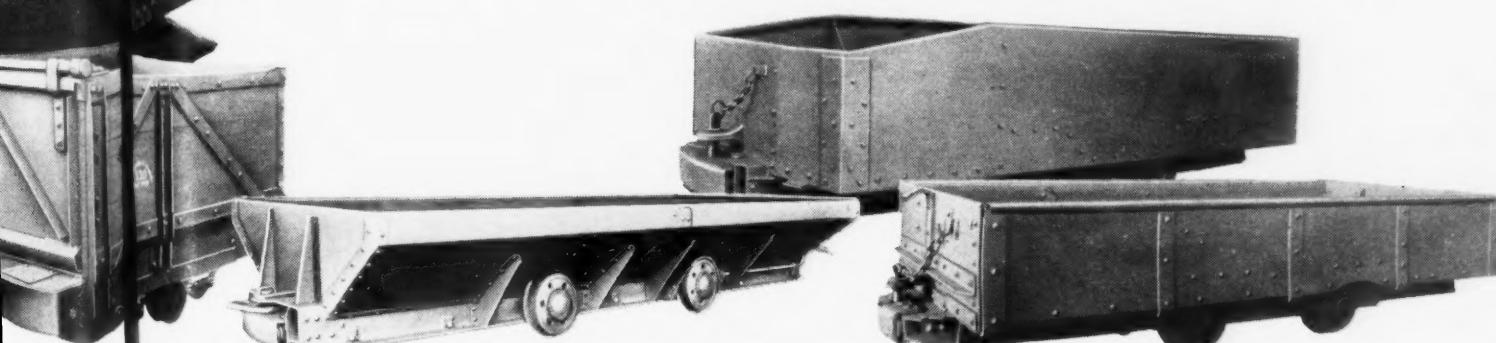
# a.c.f.

**BUILDS MINE CARS FOR ALL  
AND BUILDS WELL**

**a.c.f.** Mine Cars of all types and sizes are truly "tailored to mine measure"—to meet the specific operating conditions of your mine. Regardless of your needs, whether end dump type, rotary dump type or automatic drop bottom type—for thick or thin seams—**a.c.f.** can take care of your requirements. Our engineers give careful study and utmost consideration to your operating conditions—so that cars of modern design and proper construction will be furnished you—to increase your production and lower your costs. Discuss your transportation problems with our sales representatives — now! They are anxious to serve you.



NEW YORK  
CHICAGO  
ST. LOUIS  
WASHINGTON  
CLEVELAND  
PHILADELPHIA  
SAN FRANCISCO  
PITTSBURGH  
HUNTINGTON, W. VA.  
BERWICK, PA.





# Dust-proof coal

## IS EASIER HANDLED — EASIER SOLD

Oil-treated coal stores better and suffers less degradation. Being freeze-proof, it unloads easily and handles better in all weather. As the effect of Permatreat Coal Spray is lasting, coal can be stored longer in yards or the customer's basement without becoming dusty.

When coal is treated with Ashland's Permatreat Coal Spray, dust particles are

sealed to each lump of coal and become part of the saleable load, eliminating the loss and annoyance to the coal dealer caused by excessive coal dust.

Coal dealers prefer to buy from a mine operator who supplies coal treated with Ashland Permatreat Coal Spray, and both find many advantages in such coal. Let us give you all the facts.

**ASHLAND OIL & REFINING COMPANY**  
ASHLAND, KENTUCKY

## EVERY DAY IT PAYS ITS WAY

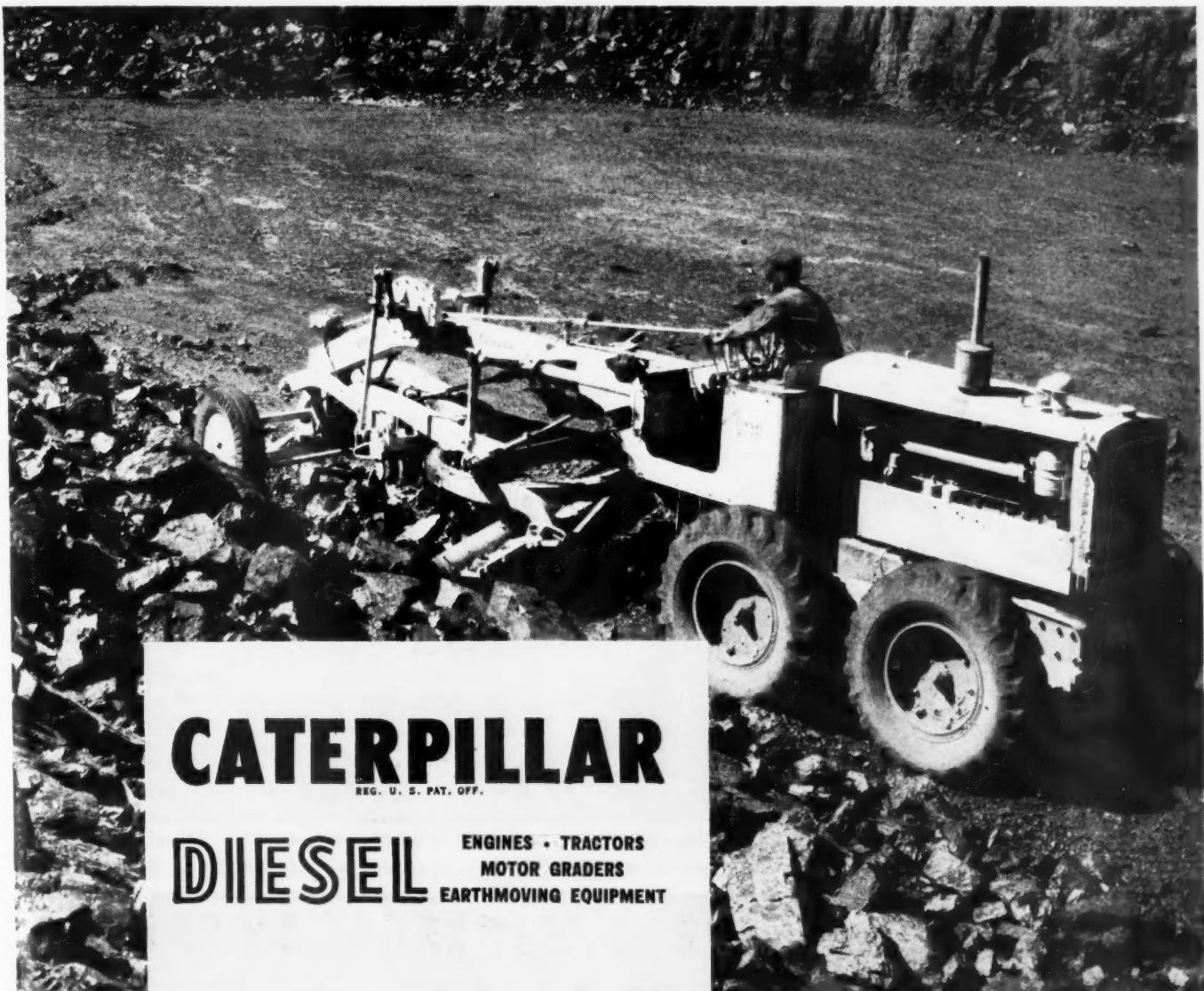
This "Caterpillar" Diesel No. 12 Motor Grader is a bear for work. At the Edna Coal Company, Oak Creek, Colorado, it handles a dozen different jobs around the strip mine.

One of its main tasks is windrowing coal for the shovel after shooting—1000 tons per 8-hour day. But it is also used for cleaning the face of the coal, building and maintaining haul roads, constructing drainage ditches in the pit, and removing the deep snow that is a winter-long handicap at that 8500-foot altitude.

To put it in the words of the owners—"Our No. 12 is just about as valuable a piece of equipment as we have."

Every "Caterpillar" Diesel Motor Grader is built with the extra ruggedness to keep it working dependably, month in and month out, under the toughest conditions. Backing its long, profitable life is the efficient service of a dealer organization that has earned its reputation as the best in the business.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS



**CATERPILLAR**  
REG. U. S. PAT. OFF.

**DIESEL**

ENGINES • TRACTORS  
MOTOR GRADERS  
EARTHMOVING EQUIPMENT

# CONFIDENCE...



Manufacturers of Wire Rope and Strand • Fittings • Slings • Screen, Hardware and Industrial Wire Cloth • Aerial Wire Rope Systems  
Hard, Annealed or Tempered High and Low Carbon Fine and Specialty Wire, Flat Wire, Cold Rolled Strip and Cold Rolled Spring Steel • Ski Lifts



# .....how much is it worth?



IT WAS NINE YEARS before the first gasoline-driven automobile in the United States was operated by C. E. Duryea that the Brooklyn Bridge was opened in 1883. This fabulous engineering achievement was the culmination of over 26 years of planning and building, of bold vision and heart-breaking struggle, by John A. Roebling and his son Washington.

But the steadfast confidence of father and son in the success of their amazing venture is vindicated daily by the modern traffic this world-famous bridge continues to carry now . . . 64 years later.

How much is that confidence worth to you today . . . and to the John A. Roebling's Sons Company, now embarked on a multi-million dollar expansion program to meet the future's challenge?

Confidence is the driving power behind our efforts to make better products do better work for you.

## YOU CAN'T GO WRONG—IF YOU USE THE RIGHT "BLUE CENTER" ROPE

There's no better way to save wire rope dollars than to use the right rope for your job. That means the right grade of steel, the correct construction, the proper size. And your choice is easy when you specify Roebling "Blue Center" Steel Wire Rope.

In "Blue Center" you get what we feel sure is the finest rope steel made. Secondly, you have a wide range of constructions and sizes to choose from . . . in both preformed and non-preformed types.

Why not make the Roebling Field Engineer your right-hand man in selecting wire rope that will give you peak performance? Call him at our nearest branch office.

JOHN A. ROEBLING'S SONS COMPANY

TRENTON 2, NEW JERSEY

Branches and Warehouses in Principal Cities

Electrical Wire and Cable • Suspension Bridges and Cables  
Aircord, Aircord Terminals and Air Controls • Lawn Mowers



The **RIGHT** steel . . .

The **RIGHT** construction . . .

The **RIGHT** size . . .

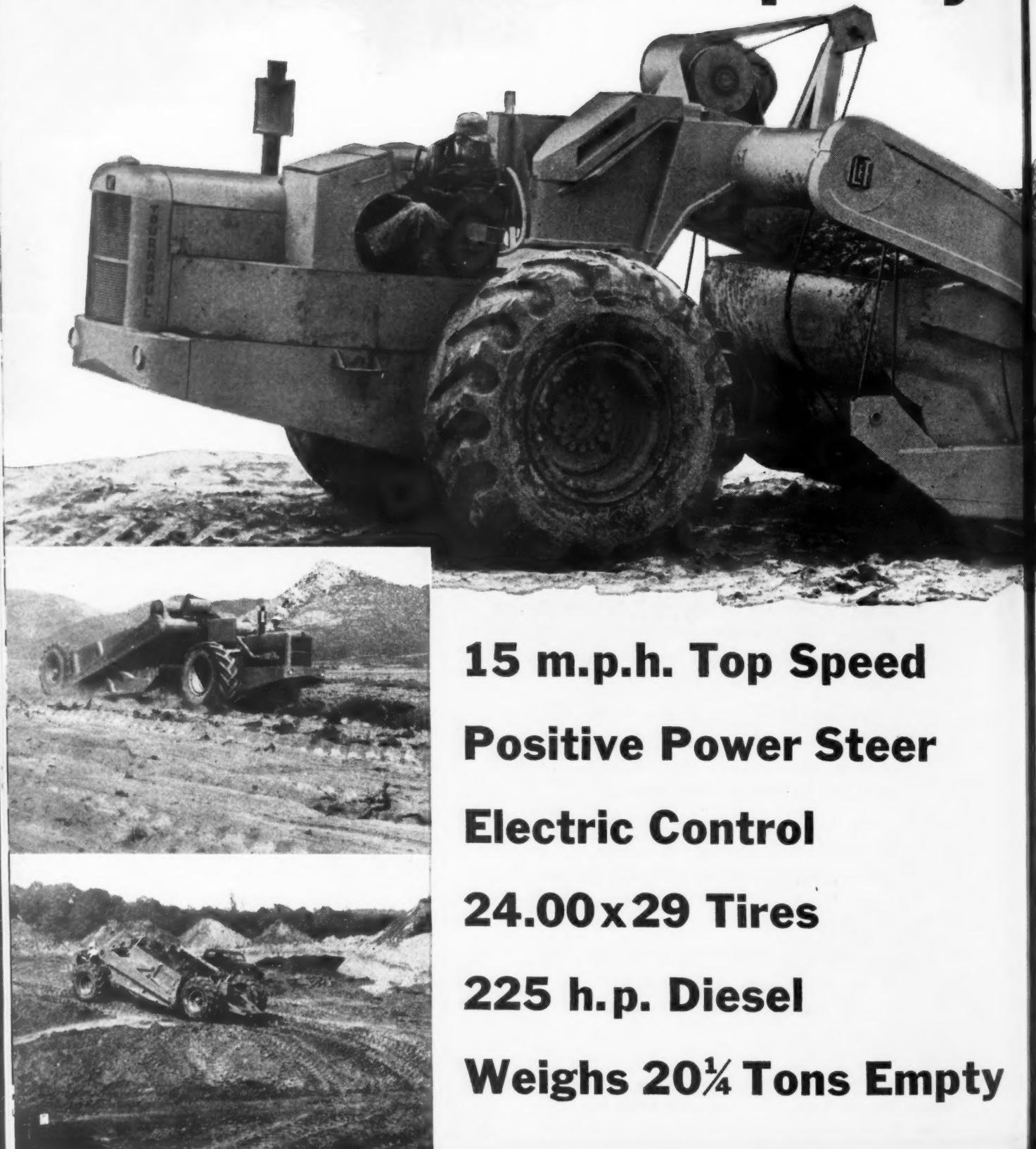
—FOR YOUR JOB!

# ROEBLING

A CENTURY OF CONFIDENCE



# INCREASE PRODUCTION with extra-capacity



**15 m.p.h. Top Speed**

**Positive Power Steer**

**Electric Control**

**24.00x29 Tires**

**225 h.p. Diesel**

**Weighs 20½ Tons Empty**



**See your LeTourneau Distributor NOW for  
complete information on prices and delivery**

# on your BIG yardage jobs **"B" TOURNAPULL**



## CHECK HOURLY YARDAGE PERFORMANCE

Haul — One Way	Sand	Common Earth	Dense Clay
300'	426	379	331
500'	390	347	303
1000'	322	286	250
1500'	274	244	213
2000'	239	213	186
2500'	212	188	164
3000'	190	169	148
3500'	172	153	134
4000'	157	140	122
5000'	145	129	111
10000'	78	69	60

The above production is based on good working conditions, negligible grades, level cuts, efficient management, and a 60-minute per hour operating efficiency.

Tournapull—Trademark Reg. U.S. Pat. Off.—C66

**LETOURNEAU**  
PEORIA, ILLINOIS



# TOURNAPULLS

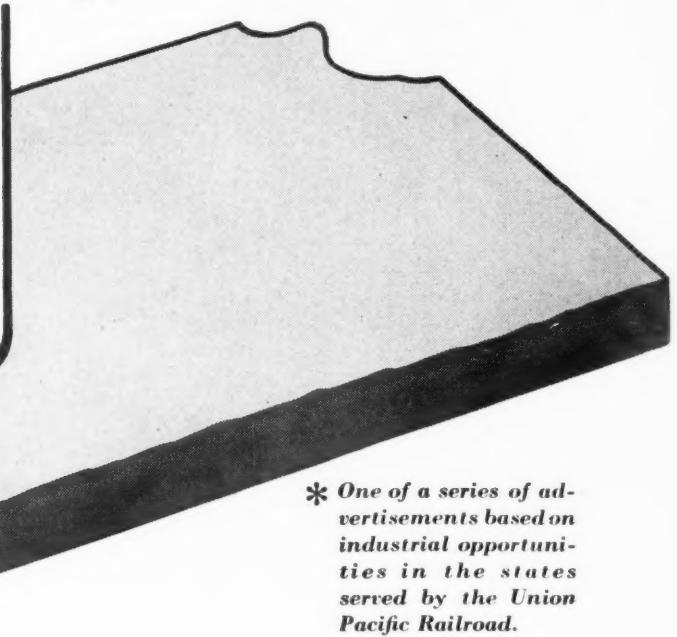
FOR LOWEST NET COST PER YARD



## TREASURE MAP OF INDUSTRY

RICH NATURAL RESOURCES  
CENTER OF NATIONWIDE MARKET  
PROGRESSIVE INDUSTRY  
FIRST IN WHEAT PRODUCTION  
PRODUCTIVE AGRICULTURE  
ABUNDANT WATER  
DEPENDABLE RAIL TRANSPORTATION  
NATIVE BORN WORKERS  
MODERATE LIVING COSTS

# Kansas \*



\* One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.

**K**ANSAS—almost in the exact geographical center of the United States; an important factor to industries serving nationwide markets.

Agriculture is king. Kansas normally ranks first in wheat production. In addition to grains, vegetables and fruits, a large part of farm income is derived from livestock and poultry.

Kansas industry keeps step with agriculture. There are approximately 2,500 manufacturing and processing establishments. Over four million

tons of coal are mined annually. Here is the largest natural gas field in the world. Eighteen principal rivers with two great watersheds provide an abundance of water. The population is 97 per cent native born.

★ ★ ★

Kansas . . . the hub of a rich market; a treasure chest of natural resources with dependable labor; outstanding public health record; moderate living costs; and excellent transportation over Union Pacific rails.



be Specific - say

**"Union Pacific"**

\* Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska, for information regarding industrial sites.

**UNION PACIFIC RAILROAD**  
THE STRATEGIC MIDDLE ROUTE

# You Get GOULD Service If you are on the Map



Gould "Twin Power" Batteries have the proven Kathanode construction: specially designed grids, long lasting Black Oxide active material, mats of layered spun glass, perforated rubber envelopes and Durapor rubber separators. To this Gould has added "Twin Power," a refinement in plate balance that gives even longer, more dependable and sustained power.

Gould Service Engineers will make periodic inspections of your batteries. In the case of damaged units, on-the-spot repairs will be made whenever possible. Gould Service Engineers can also advise on proper installations and help set up correct battery servicing and maintenance schedules.

Gould service centers are located in every industrial area. Call or wire Gould in any of the following cities: Boston, Mass. • Cincinnati, Ohio • Cleveland, Ohio • Chicago, Ill. • Denver, Colo. • Depew, N. Y. Detroit, Mich. • East Point, Ga. • Kansas City, Mo. Los Angeles, Cal. • New York, N. Y. • Philadelphia, Pa. • Pittsburgh, Pa. • St. Louis, Mo. • St. Paul, Minn. • San Francisco, Cal. • Washington, D. C. West Salem, Ore. • Kingston, Ont., Canada.

**GOULD STORAGE BATTERY CORPORATION, Depew, N. Y.**

**GOULD** KATHANODE **BATTERIES**



*When in the Buffalo area visit the Gould Research Laboratory. See for yourself how modern research is solving your battery problems.*

**NEW**

# Superla

## mine lubricant number 0



...means more coal IN here

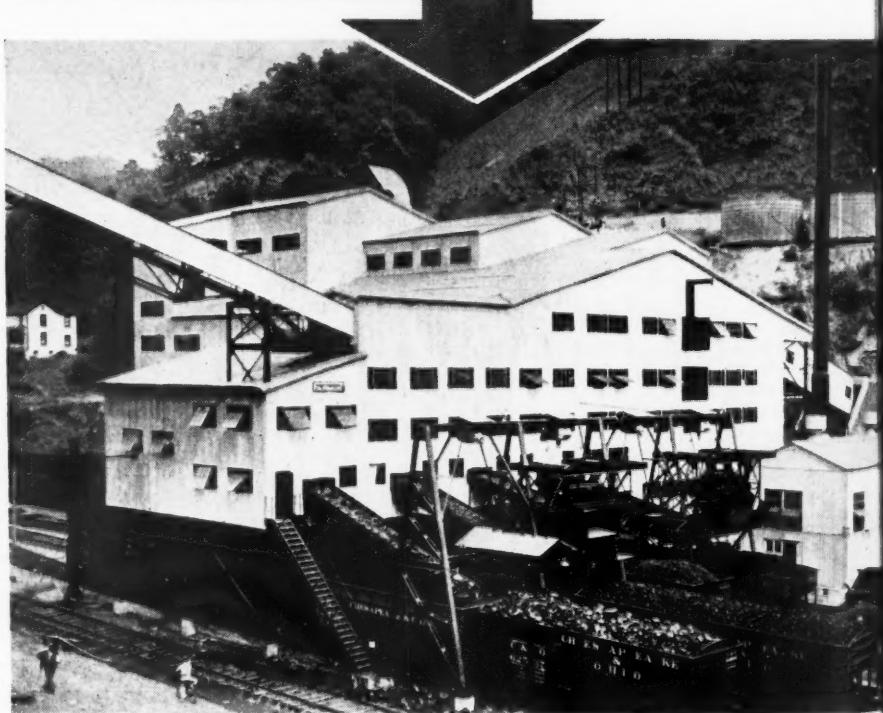
and more coal OUT here

Coal loads out fast when Superla Mine Lubricant No. 0 is in your oil-lubricated gear cases because:

**Down-time is reduced.** Gear cases stay clean with Superla No. 0. It eliminates shutdowns for cleaning cases and replacing worn parts.

**Loading is speeded up.** Troublesome carbon formation on clutch plates is eliminated with Superla No. 0. Operators find machines handle easier—load faster.

How this new and different lubricant can bring these advantages is described below. A Standard Oil Lubrication Engineer will help you make a test to prove that the difference is important to you. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, for the Engineer nearest you.



Superla Mine Lubricant Number 0 brings to the loader field a new application of a recent development in lubricants. To manufacture this new type of lubricant, an oxidation inhibitor is added to a solvent refined oil made from selected crudes. The result of this combination is an oil

with remarkable resistance to heat. In loaders, this heat resistance means less deposits formed under the high gear-case temperatures. In addition, because of a detergent in the oil, contaminants are prevented from settling out and depositing on gears and clutch plates.

**STANDARD OIL COMPANY (INDIANA)**

**STANDARD  
SERVICE**



## THE RUBBER "MUSCLE" THAT POWERS A 2-TON HAMMER

Another problem solved by **BWH**

A New England contractor needed a new steam hose on his pile driver . . . a "muscle" to swing the rig's 2-ton hammer. He wanted a top-quality hose that could take the severe operating conditions . . . hammer shocks, pulsations caused by varying high pressures, and the deteriorating effect of hot oil shot through the hose to lubricate the hammer. When he called on BWH for help, our engineers recommended Bull Dog Pile Driver Hose.

This tough hose has a tube made with

a special compound, highly resistant to hot oils. An open-weave fabric anchors the tube to the carcass.

The secret of the hose's strength lies in this carcass. It's made of specially-woven duck, applied at an angle to absorb pressure stresses and shock loads. And because so many plies of duck are used, this sturdy BWH hose far outwears other "under-plied" hose.

The rubber cover is also heat-resisting . . . besides offering protection from abrasion and moisture.

This hose performed perfectly on the job . . . it's still going strong.

Bull Dog Pile Driver Hose is just one of the many quality products manufactured by BWH. Whatever your need for industrial rubber goods, look to BWH for dependable ruggedness . . . BWH distributors for dependable service.

### HAVE YOU A JOB WHERE STAMINA COUNTS?

Bring us your toughest problems . . . we're specialists in solving them. Consult your nearby BWH distributor, or write to us direct.

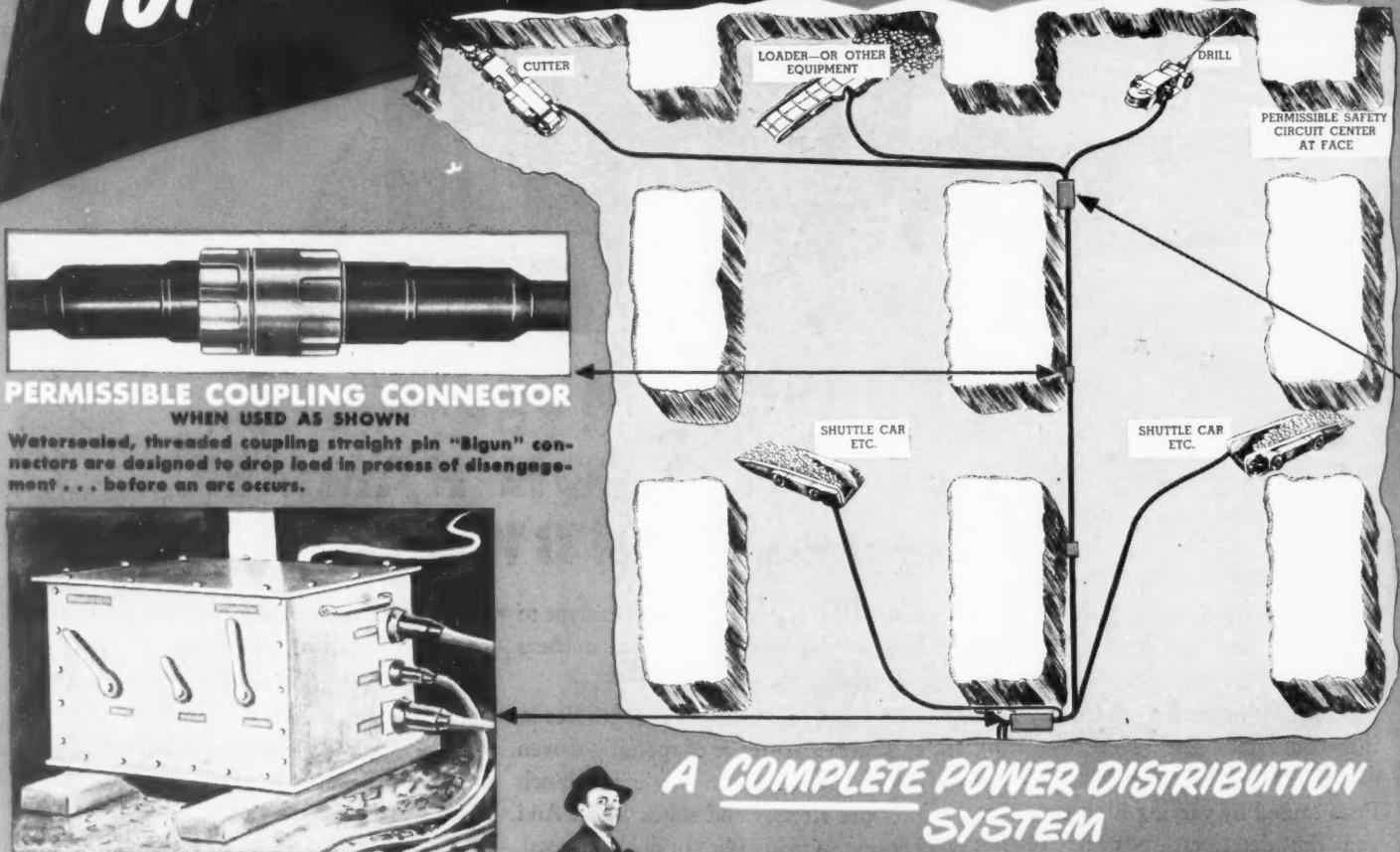
# BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in All Principal Cities

WORKS: CAMBRIDGE, MASS., U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.

# UTMOST PROTECTION

for men and equipment...



## A COMPLETE POWER DISTRIBUTION SYSTEM

Illustrated above is a typical Permissible mine layout using the Mines' Equipment Company products from power feeder line to face circuit centers. Provisions can be made for one to four outlets at the face and entry.

Consult a

Joy Engineer for details

# JOY

EXCLUSIVE SALES AGENTS IN THE MINING INDUSTRY

MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH, PENNA.

# Mines'

## PERMISSIBLE

### SAFETY CIRCUIT CENTER POWER DISTRIBUTION SYSTEM

Applicable to all mechanized mining systems, Mines' Power Distribution systems deliver maximum power with minimum cable section lengths. The Mines' System combines safety, economy and steady production.

Features of Mines' Permissible System include: restoration of power without opening explosion-tested breaker compartments; AC or DC voltages, each handling proper ampere ratings for specific equipment. One to four outlets available.



#### FOR USE AT THE FACE

Mines' Safety Circuit Center can be furnished with a ground current trip to cut power when insulation fails to a point that might be dangerous.

CONNECTORS  
WILL DROP LOAD IN  
PROCESS OF OPENING—  
PROVIDING FULL  
PROTECTION!  
ELIMINATES POWER  
ARCS AT  
CONNECTOR

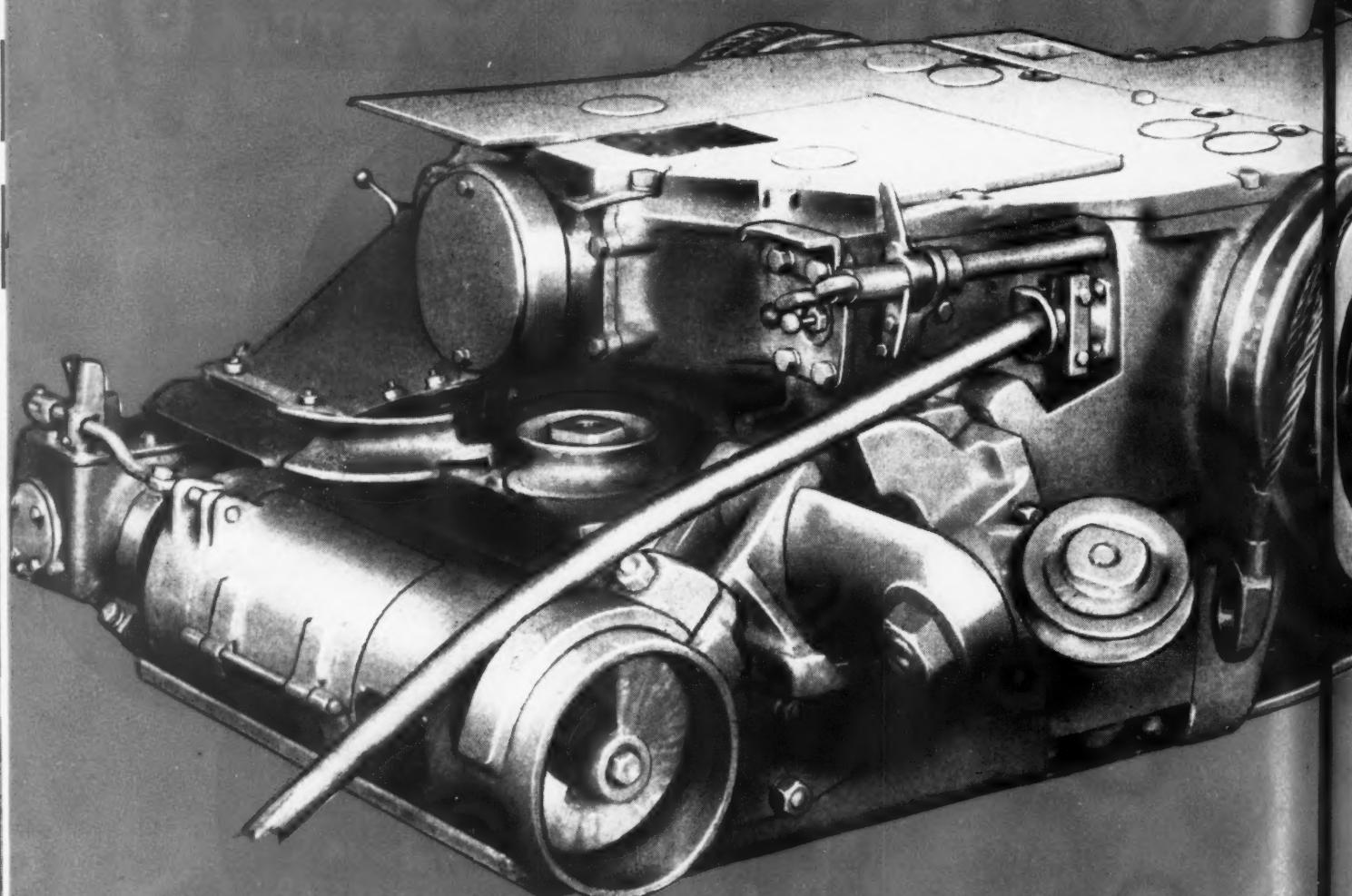
NO GLANDS  
TO MAINTAIN—  
NO FUSES TO  
REPLACE

FAST ACTING  
AUTOMATIC  
CIRCUIT BREAKERS,  
WHICH OPEN AND CLOSE  
POWER FLOW, ARE  
CONFINED IN  
EXPLOSION-TESTED  
HOUSINGS

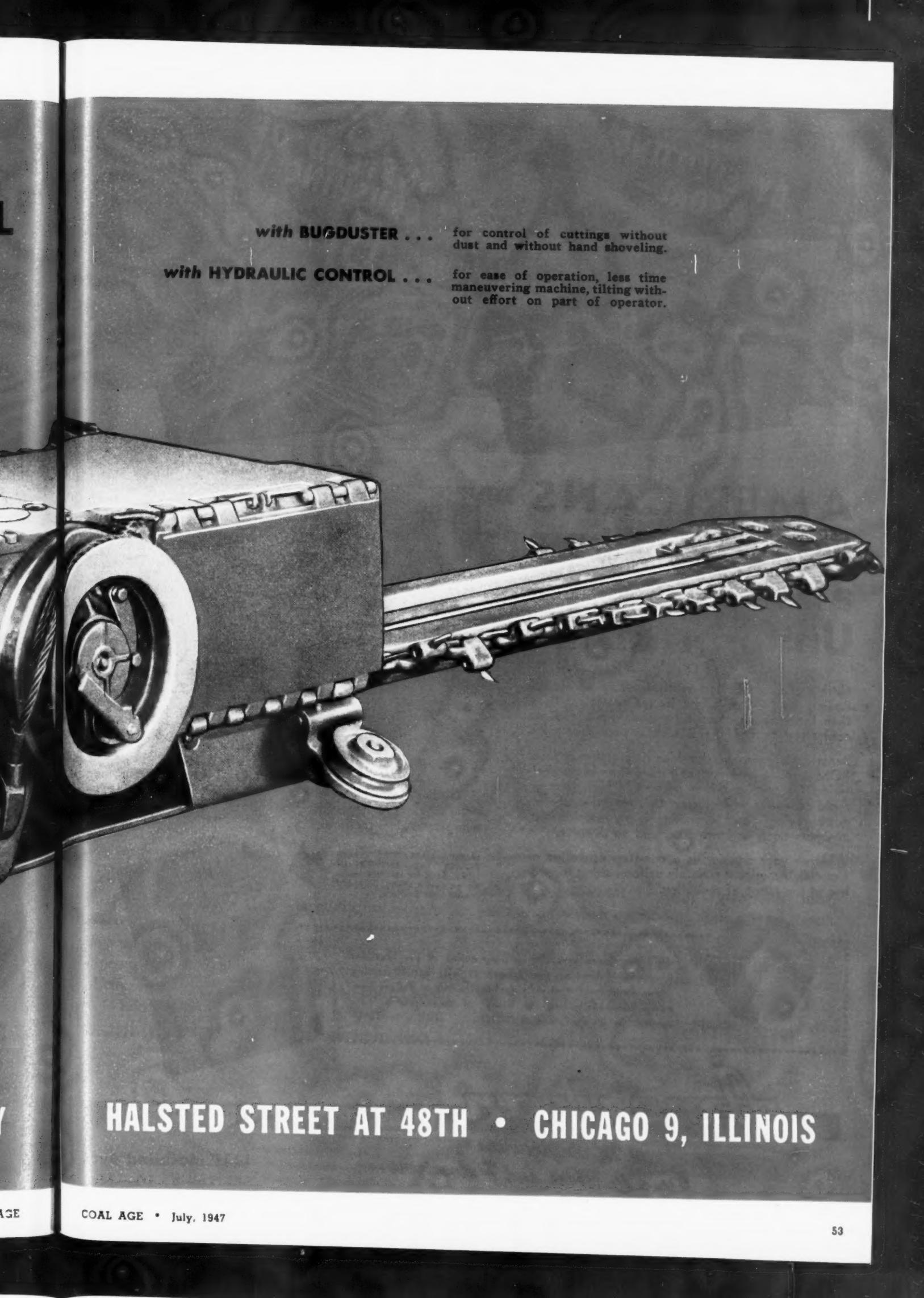
W&D ME

MANUFACTURED BY MINES EQUIPMENT COMPANY  
ST. LOUIS, MO.

# THE GOODMAN TYPE 512 SHORTWALL



GOODMAN MANUFACTURING COMPANY



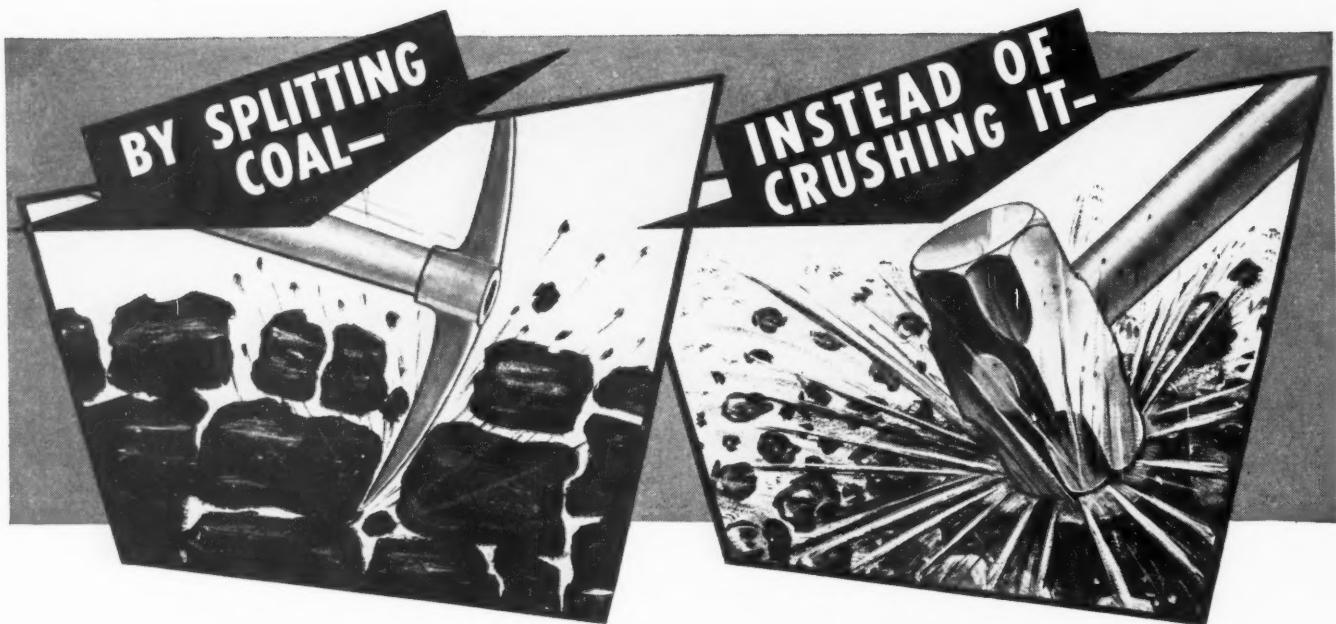
**with BUGDUSTER . . .**

for control of cuttings without dust and without hand shoveling.

**with HYDRAULIC CONTROL . . .**

for ease of operation, less time maneuvering machine, tilting without effort on part of operator.

**HALSTED STREET AT 48TH • CHICAGO 9, ILLINOIS**



## AMERICANS Minimize Fines and Produce Uniform Sizing

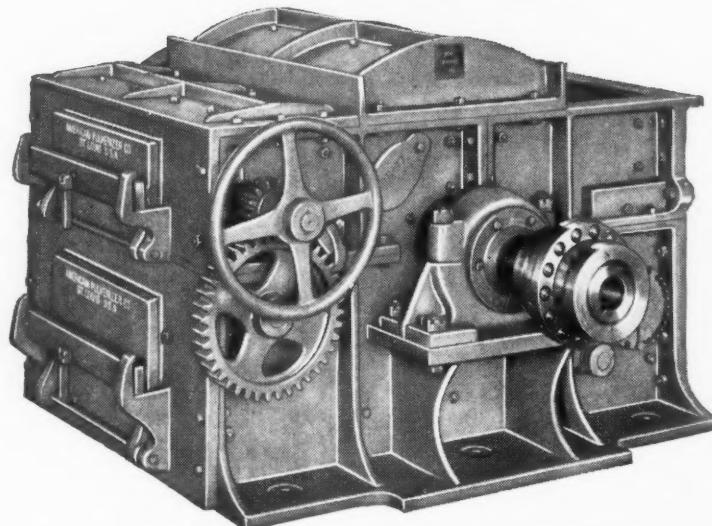
Nothing could better illustrate how American Rolling Ring Crushers give better control of fines, than the example of splitting coal with a pick-axe contrasted to crushing it with a sledge hammer.

American's patented shredder ring action reduces ROM by cleavage impact rather than blunt shattering force. This makes possible a high tonnage rapid reduction while the rotor is revolving at slow power-saving speeds—resulting in less maintenance, minimum fines, uniform sizing and no oversize.

Whether your crushing is a one-step operation or a circuit, Americans maintain uniform sizing regardless of the range of reduction.

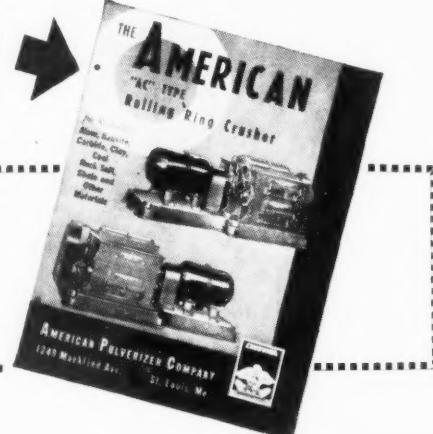


Only Americans have the splitting action of the Shredder Rings. Each shredder ring (shown at left) has 20 cutting edges. Rings revolve on individual shafts, free to deflect from tramp iron—eliminating the bother of shear pins or conventional safety devices.



The American AC Crusher is designed and built for long dependable service. The entire frame is of sectional design with easy access to crushing chamber, lined with carbon and manganese steel sections.

MANY OPERATORS HAVE FOUND THE ANSWER IN HERE. Send for this free bulletin on coal crushing data and crusher specifications.



**American** **PULVERIZER COMPANY**  
Originators and Manufacturers of  
Ring Crushers and Pulverizers

1119 Macklind Ave.  
St. Louis 10, Mo.

- improved mining machine performance
- less "down time"
- lower maintenance costs

when the

## Gulf Lubrication Engineer

is "in the picture"



THE GULF LUBRICATION ENGINEER "in the picture" is one of Gulf's large staff of experts who are ready to help you get all the benefits of improved lubrication. His background includes thorough training and broad practical knowledge of efficient lubrication of coal mining equipment.

When he enters the picture at your mine, you get practical help on every lubrication problem—

he will recommend the right Gulf quality lubricant and the best method of application. Result: less down time, better performance—and you'll be pleased to see how maintenance costs go down!

Call in a Gulf Lubrication Engineer today and ask him to cooperate with you on your lubrication problems. Write, wire, or phone your nearest Gulf office.

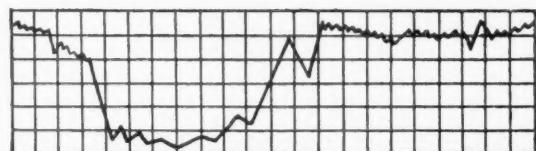
**Gulf Oil Corporation • Gulf Refining Company**

Division Sales Offices:

Boston • New York • Philadelphia • Pittsburgh • Atlanta  
New Orleans • Houston • Louisville • Toledo



# Charge Them From Off-Peak Power



When you use EDISON Nickel-Iron-Alkaline Batteries as the power units of your battery-operated haulage equipment, you will find that an off-peak period of 6 to 7 hours per day is usually enough to get all the charging done with low-cost power. That is normally time enough for full recharge of a nickel-iron-alkaline battery.



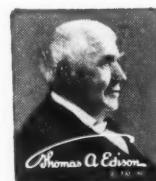
*In Mine Locomotive and Shuttle Cars EDISON Nickel-Iron-Alkaline Batteries Give You These Important Advantages*

- ★ They are **durable mechanically**; grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel.
- ★ They are **foolproof electrically**; are not injured by short-circuiting, reverse charging or similar accidents; are free from self-deteriorating reactions.
- ★ They can be **charged rapidly**; do not require critical adjustment of charge rates; can be charged directly from mine d-c supply.
- ★ They **withstand temperature extremes**; are free from freezing hazard; are easily ventilated for rapid cooling.
- ★ They can **stand idle indefinitely** without injury, without attention, and without expense.
- ★ They are **simple and easy to maintain**.

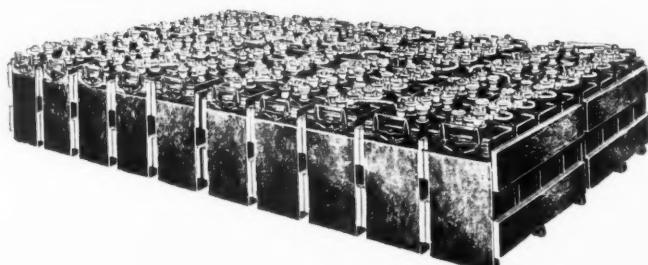
The charging can also be done direct from the d-c power lines through suitable resistors, because EDISON Nickel-Iron-Alkaline Batteries do not require critical adjustment of the charge rates.

## *Withstands Rough Usage—*

Yet this is only one of the operating advantages of EDISON Nickel-Iron-Alkaline Batteries. Their steel cell construction successfully withstands rough usage. Their electrolyte is an alkaline solution that is a natural preservative of steel. Their electro-chemical principle of operation is free from self-destructive reactions. As a result, they stay on the job and out of the repair shop; give longer service life than any other type of battery; cut annual operating cost. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. In Canada: International Equipment Company, Limited, Montreal and Toronto.*



**EDISON**  
**Nickel • Iron • Alkaline**  
**STORAGE BATTERIES**



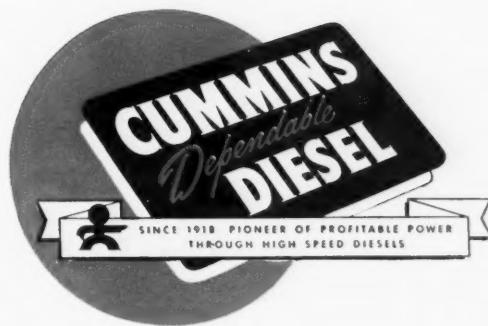
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# Available...

**in greater quantity than ever before**

... because more Cummins Dependable Diesels were built in a recent six-months period than in any other like period since Cummins pioneered the first practical high-speed Diesel.

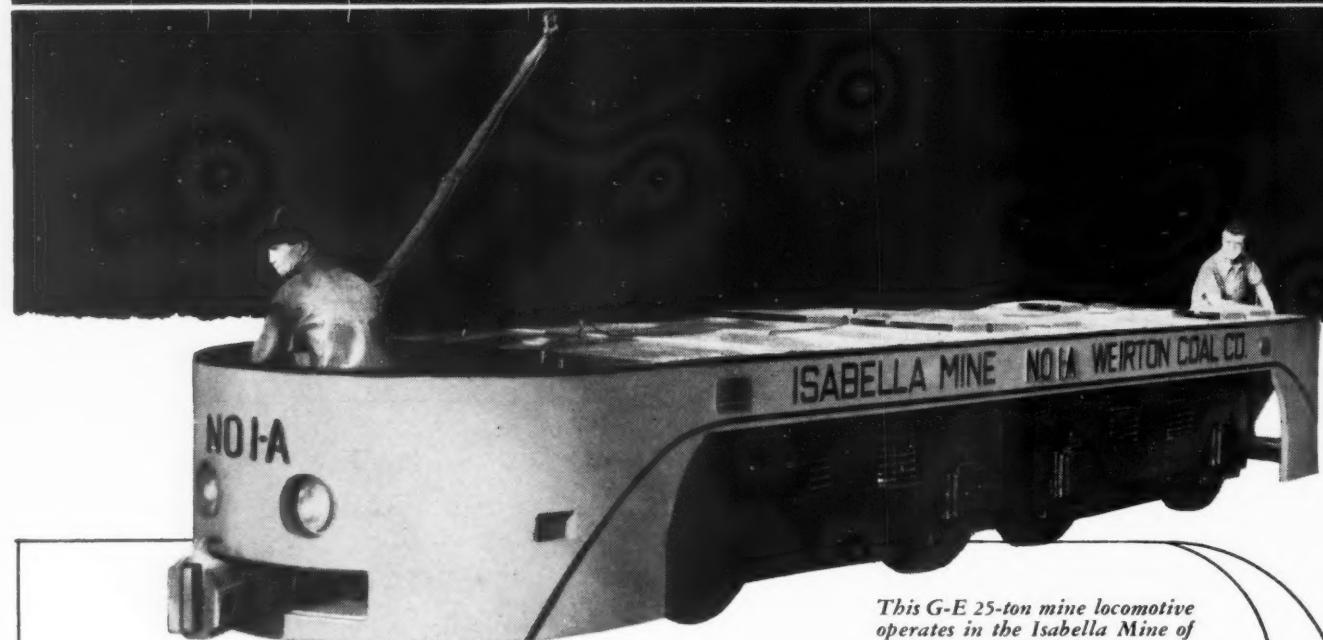
... because Cummins has expanded floor space 44.8% since the end of the war.

... because Cummins is now completing a \$3,000,000 program of plant expansion and improvement.

But in producing *almost* enough Cummins Diesels to satisfy user demand, the company has not deviated from its basic policy: to build the best Diesel possible . . . to protect each owner's investment with a field organization offering ample service facilities, competent help and sufficient parts no matter where or by whom the engine is sold.

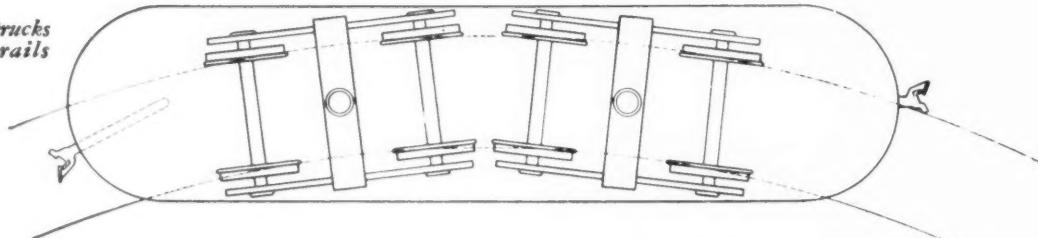
CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

# ...MAKES MORE

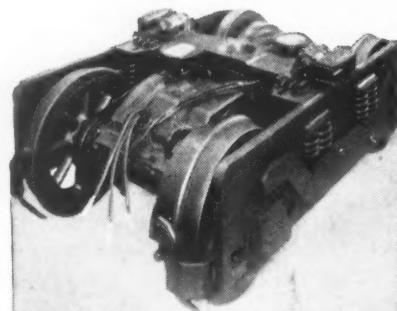


*This G-E 25-ton mine locomotive operates in the Isabella Mine of the Wierton Coal Company at Isabella, Pennsylvania.*

*Swivel trucks follow rails freely.*



**EVEN AT HIGH SPEEDS—it rides smoothly and safely because double-swivel trucks give you these important advantages:**



**Low weight per axle**—reduces load on rails—decreases lateral forces on track.

**Short rigid wheel base**—and swivel connection to frame permits wheels to follow rails freely—reduces track maintenance and flange wear.

**Short overhang at ends**—AND snubber springs reduce oscillation and promote smooth riding.

# E TRIPS PER SHIFT

## ...sets new production records!

**New, high-speed G-E mine haulage locomotive pulls 800-ton load at 11.5 mph—gives you lower hauling costs per ton!**

With length of haulage runs from gathering point to tipple on the increase, the operators need a faster and more powerful haulage locomotive. The new smooth-running General Electric 25-ton haulage locomotive is the answer to this need. Here is why:

**HIGH OPERATING SPEEDS**—Powered by four 120-hp motors, this new locomotive can pull a load grossing 800 tons at 11.5 mph with anti-friction mine-car bearings under average conditions. It has a top speed of 40 mph.

**SMOOTH-RIDING QUALITIES**—Smooth-riding qualities of this new unit are obtained by using double-swivel trucks as used

for years on surface railroads. Better distribution of load reduces strain and wear on the rails.

**LESS MAINTENANCE**—Design and mounting of the traction motors promotes continuous trouble-free service. Heat dissipation is expedited by motor-driven blowers. An all-welded frame provides a permanently rigid structure without joints.

In the mine where it is now operating, this new locomotive gets the coal out in less time. Fewer locomotives, cars, and crews are required and traffic congestion is eliminated. This means a lower cost per ton of coal mined.

Bulletin GEA-4774 gives more details, dimensions, etc., on this new locomotive. Mail the coupon for your copy. No obligation of course. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

# GENERAL ELECTRIC

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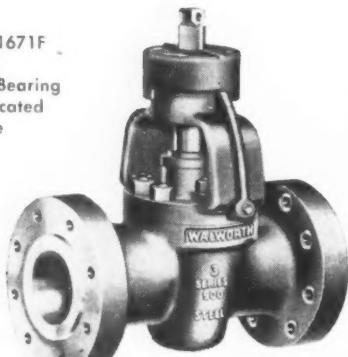
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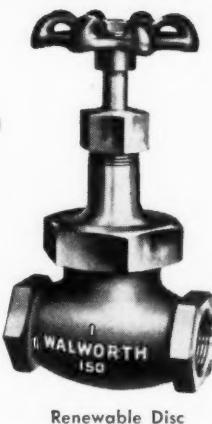
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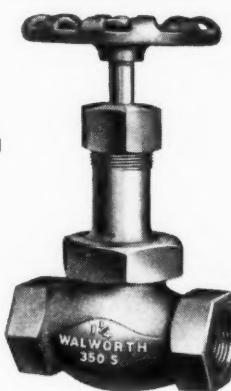


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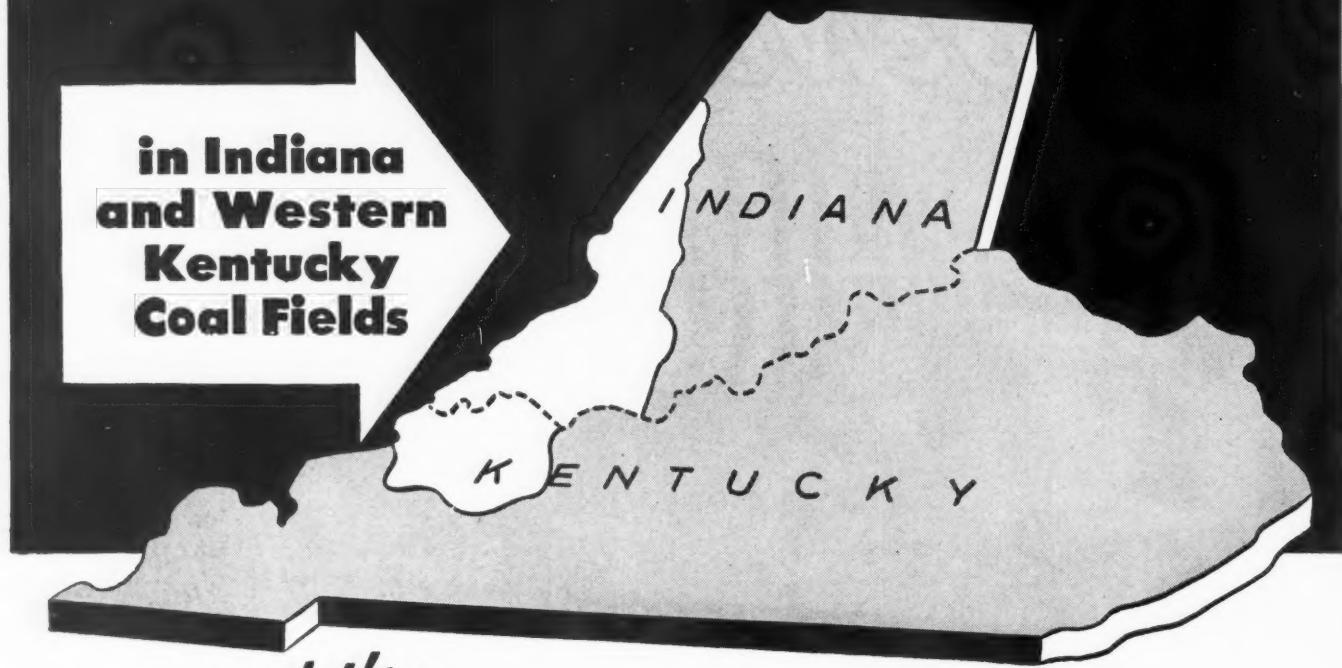
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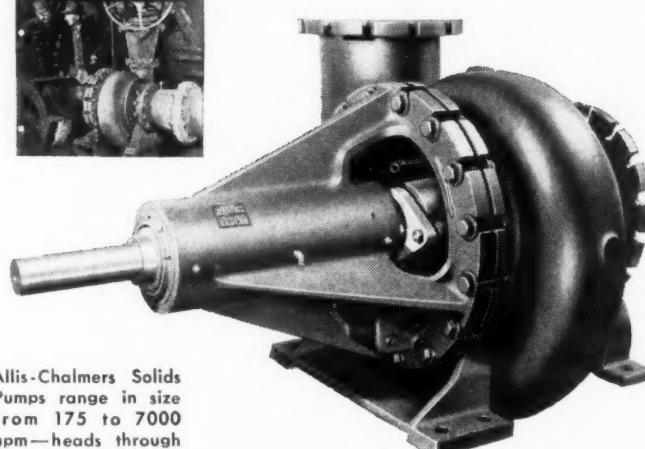
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Illustrated is Parallel Duplex Mining  
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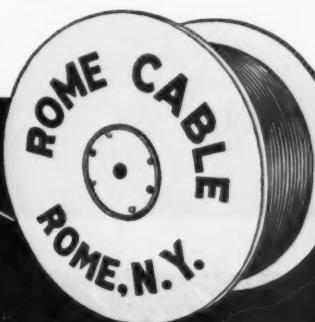
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- TUNES
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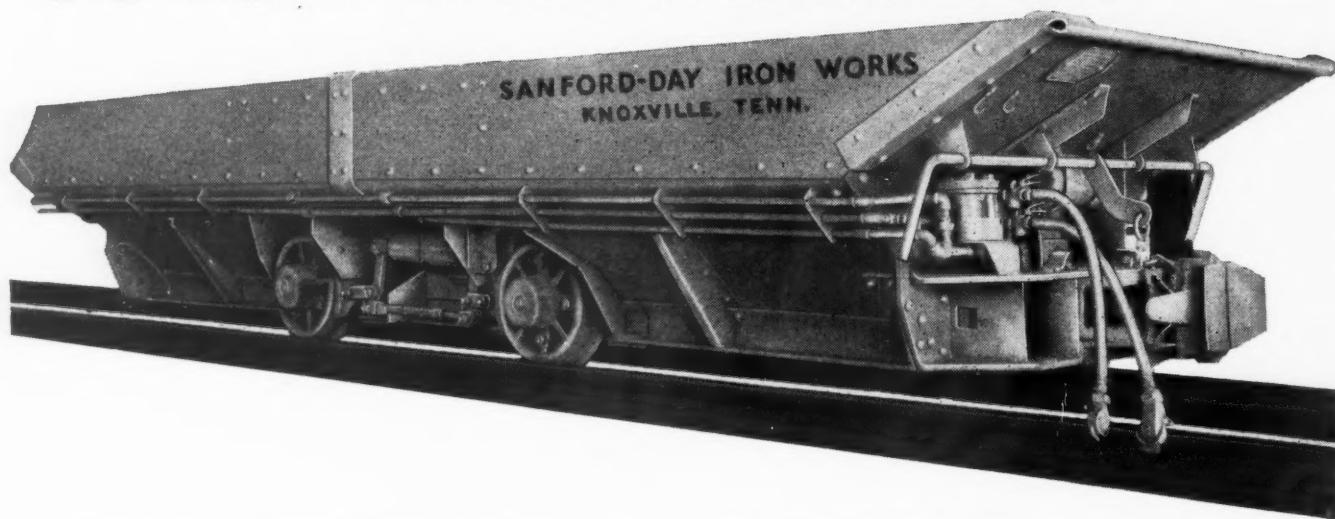
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# Did You See Our "90 TON" Flexible Mine Car?



Here is the S-D overlapping "Automatic" we had on display at the Cleveland show in May. It was taken out of service at the Black Star Coal Co. mine at Alva, Ky., where they pull 15 of them to the trip. At 6 tons per car, this means 90 tons of coal per trip, and since these new overlapping cars do not have to be disconnected, you can understand why we call the trip a 90-ton flexible mine car.

The overlapping ends of cars permit loading any number of cars from end to end, by conveyor, without spillage between cars and while cars are in motion.

In addition to the above advantages, this car has our under-the-car unlatching device with

two separate latch hooks—no latch levers on end of cars to give trouble. Furthermore, it is equipped with S-D "Floater" Ball Bearing demountable wheels, Westinghouse air brakes and Willison automatic couples.

This car may not fit your requirements, of course, but remember that regardless of conditions, there is an S-D 1-2-3 "Automatic" to suit you. And, after installation, big savings in labor and money are certain.

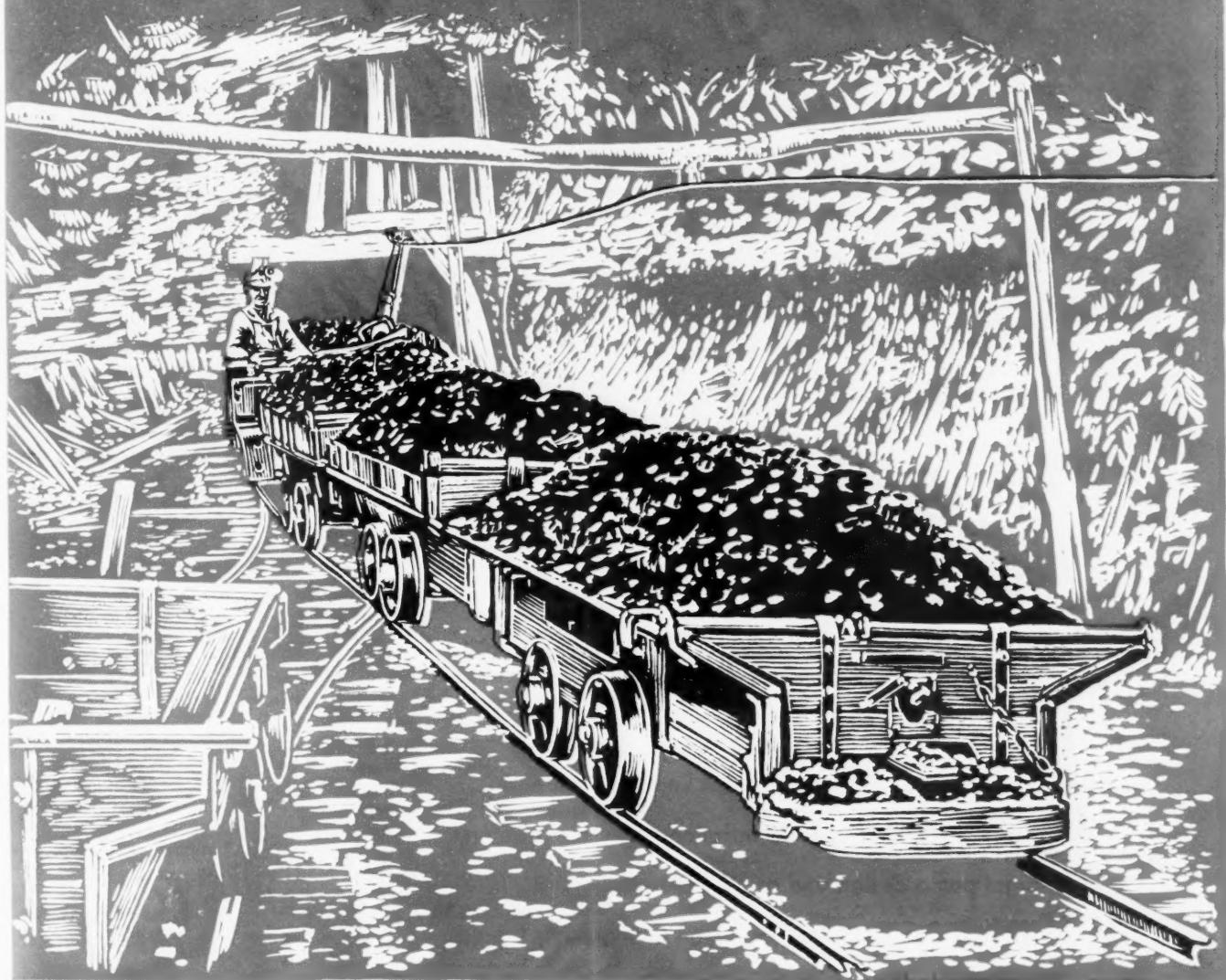
Do you know you can have all the advantages of S-D "Automatics" without buying the cars? You can lease them at a cost of only about 2 cents per ton of coal hauled over a 15-year period. Write to us for all the details.



Note in picture at left how the overlapping end of this car permits continuous loading without stopping conveyor or movement of cars.

*Sanford-Day Iron Works, Knoxville 9, Tennessee*

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...with **Tycol mine car greases**"



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Chicago • Detroit  
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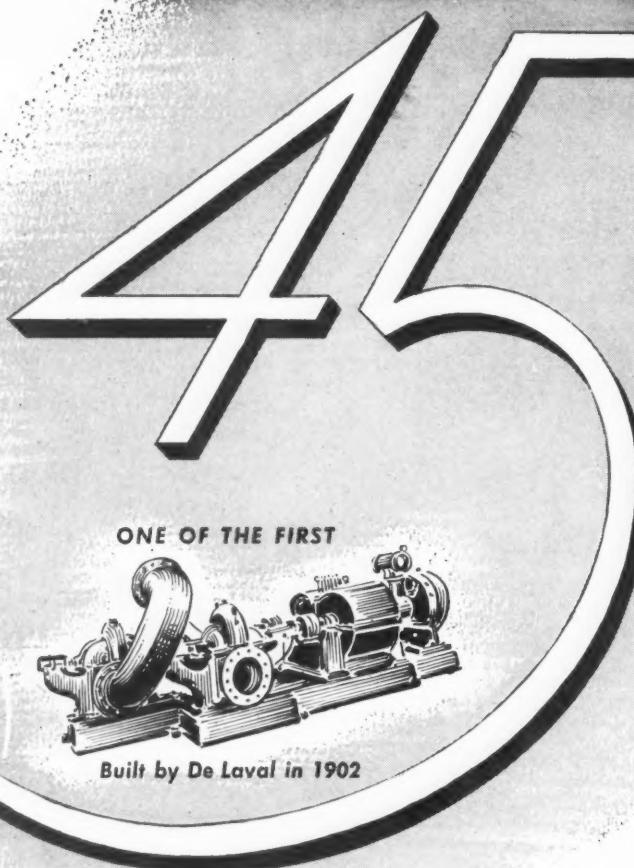
**"Life of bearings prolonged . . .  
Power requirements slashed . . .  
Less lubricant needed . . .  
Production accelerated . . .  
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Like mining engineers everywhere, you, too, will find that the *new* Tycol Mine Car Greases are ex-

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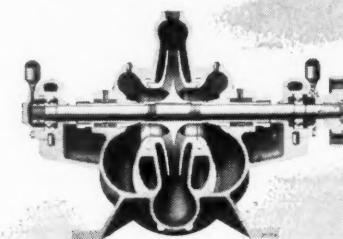
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**LUBRICATION—"ENGINEERED TO FIT THE JOB"**

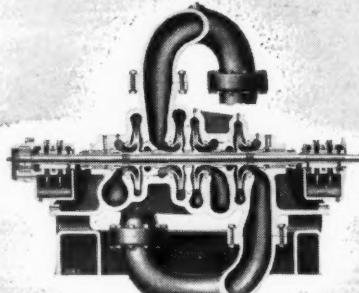


# 45 Years of PUMP IMPROVEMENT

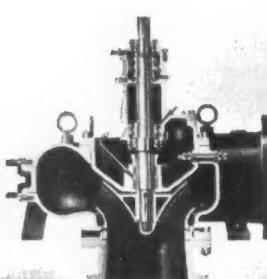
Modern De Laval centrifugal pumps represent the culmination of more than 45 years of continual improvement and perfection. This long period of concentration upon the problems of centrifugal pump design and application places at the user's command a complete line of modern, high quality pumps and a vast store of knowledge concerning pump application problems.



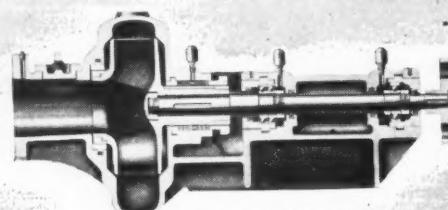
SINGLE STAGE, DOUBLE SUCTION PUMP



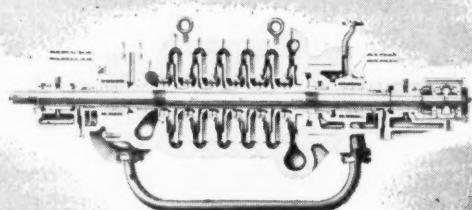
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CLOGLESS PUMP



HIGH PRESSURE, MULTI-STAGE PUMP

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AS THE RATIO between overburden depth and coal seam thickness has increased, Bucyrus-Erie has developed larger, longer range strippers designed to make new coal fields available for economical mining.

Typical of these machines is the 1050-B stripping shovel. Consider the output record of one of these machines now operating in the Flamingo Mine of Fairview Collieries Corp. (Ayrshire subsidiary). Month after month, this 1050-B has removed an average of more than a million cubic yards of over-

burden—an output that clearly has made the stripping in this pit an economical mining operation. In other pits, too, 1050-B shovels as well as 1150-B and 650-B walking draglines are repeatedly demonstrating how Bucyrus-Erie-developed machines have extended stripping frontiers.

The same engineering and manufacturing experience which has fostered such steady progress in excavating equipment in the past is still at work, constantly developing new strippers, loaders, drills and tractor equipment that will continue to earn the "years ahead" distinction.

**Bucyrus-Erie Company**  
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IN MODERN  
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## EDISON ELECTRIC CAP LAMPS

## M.S.A. COMFO CAPS

Safe, brilliant, effective illumination, combined with lightweight, comfortable, sturdy head protection speeds production, reduces hazards! Edison Electric Cap Lamps and M.S.A. Comfo Caps lead the field in modern mining. Get the facts in a practical demonstration.



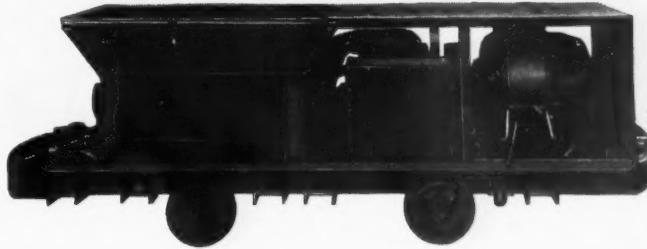
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SELF-GENERATING



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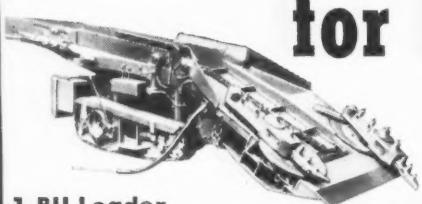
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INCREASED PRODUCTION . . .

LOWER COST PER TON . . .

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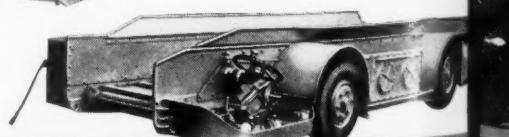


14 BU Loader



42" Shuttle Car

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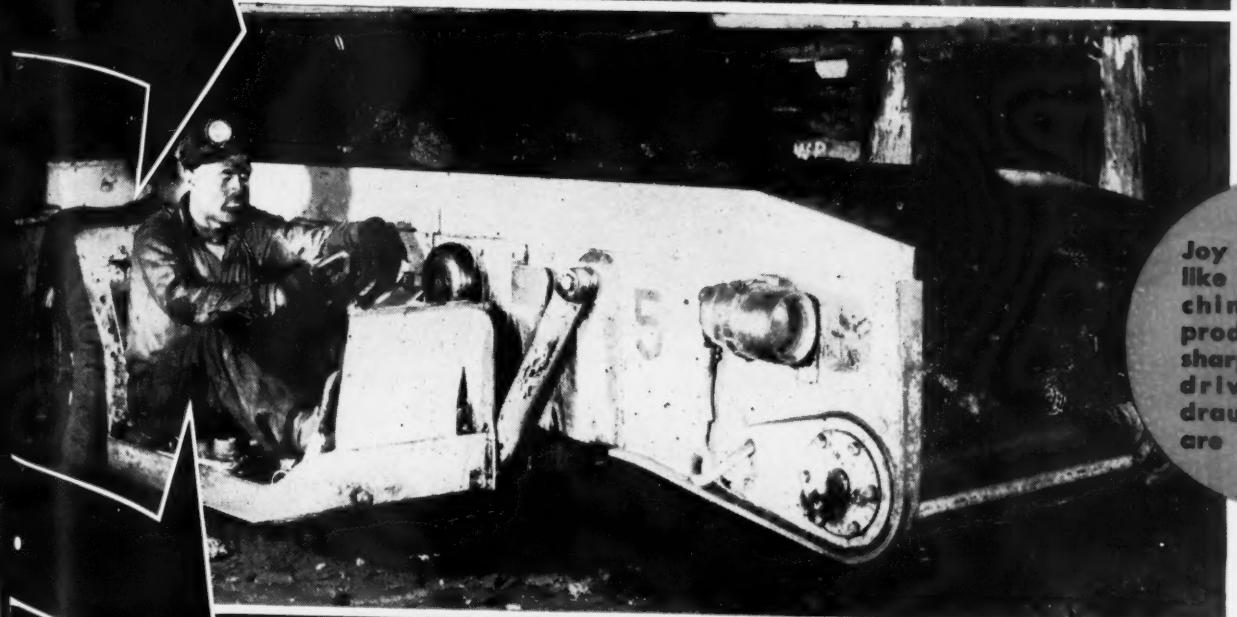


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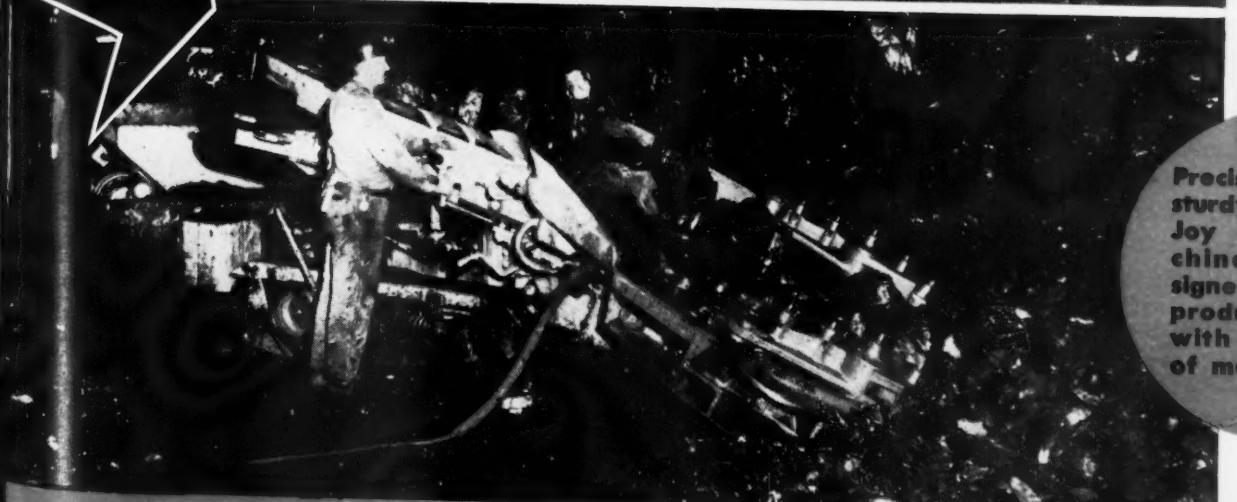
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Joy Loaders take less time to load more tonnage. They're crawler mounted, easy to operate and maneuver.



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detonates every cartridge it contacts with terrific velocity, getting peak power from every charge. Yet, at the same time, it lets you plan efficient shot-rotation so that proper relief of burden comes where it should, when it should.

Primacord is available in three types, each designed to meet particular blasting conditions. Ask your explosives company about them, or write us direct.

SP-73

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JULY, 1947

Ivan A. Given, EDITOR

## Second Step

PASSAGE of the Taft-Hartley bill over a Presidential veto marks the first major step toward a return to fairness in the federal approach to relations between employers, the public and labor leaders since the Wagner Act was put over by the First New Deal. But the Taft-Hartley veto, along with the tax-bill veto, makes it even clearer that the present administration is trying to go the First New Deal at least one better in several important respects:

1. Constant expansion of the power of the executive department free from Congressional and constitutional checks. The tax-bill veto, for example, contained the following significant sentence (italics supplied): "The reduction of government receipts resulting from this bill would be such that the *government* could ill afford to make fair tax reductions at the proper time in the form of a carefully considered revision of our entire tax structure." Since he was rejecting the settled decision of the elected representatives of the people, it seems inevitable that in making that statement Truman was construing "government" to mean his executive branch only and was reflecting the determination of that branch to arrogate to itself the long-held right of the citizen to decide the taxes he should pay and how they should be spent.

2. Perpetuation of itself in office by aiding and abetting labor dictators—and others seeking power at the expense of the individual—in return for their support.

As long as the administration clings to these and allied principles, the Taft-Hartley Act and kindred measures can be considered nothing more than the first steps in the right direction. Enforcement is a vital consideration. If not enforced, the good these acts can do will, of course, be nullified. The records of the First and Second New Deals are studded with failures to enforce laws against their supporters, either by ignoring them entirely or "interpreting" them to achieve the desired ends.

In view of the administration's known record and its desperate attempts to defeat the Taft-Hartley bill, good enforcement is perhaps too much to expect from the men now in office. But an opportunity to put in a new administration more keenly conscious of its constitutional responsibilities of fairness rather than partiality and service rather than dictation is not too far off. Since it is just as important as a revision of the legislative approach, there should be no relaxation in the drive for an administration dedicated to administration and not to building up its own power—and that of its supporters—at the expense of the rights and freedoms of the individual.

## Poor Substitutes

HOW FAR federal officials and union leaders are indulging in self-seeking in present attempts to extend federal and union authority over coal-mining safety matters is perhaps a matter of individual opinion. But there is, to date, little evidence that either are giving much thought to working jointly with the operators and state safety authorities or that they are much interested in enlisting the interest of the miners themselves. Since these are vital considerations, there is some ground for concluding that these federal and union officials are not too averse to using safety as a stepping stone to greater authority over industry affairs for themselves.

Real progress in safety, as has been repeatedly pointed out, cannot be achieved by fiat action, whatever the motive. Laws and codes can build up the authority of individuals or government agencies but maximum safety can be attained only when the men on the job—workers as well as officials—understand and are sold on the idea. That requires joint effort and education—a sincere attempt to get everybody concerned working together. Attempts to supersede management and state authorities and to excuse workers, as well as their representative, from responsibility, are poor substitutes.



# YOU And Your

AS A COAL MINER, you're working steadily and earning more money than any other group of workers in the country. Naturally, you'd like to see things stay that way—or get even better.

What's ahead for the coal industry—and for you—a year, five years, ten years from now? Will your job be as good or better? What can you do to help things along and help yourself to a better living?

To help you with the answers, to give you an idea of what you can expect and to make clearer—all in one place—how you can make your coal-mining job an even better one, is the idea behind this little booklet.

Think about coal for a minute. It's a basic thing. As long as we need coffeepots and washing machines and automobiles, as long as we need heat for our

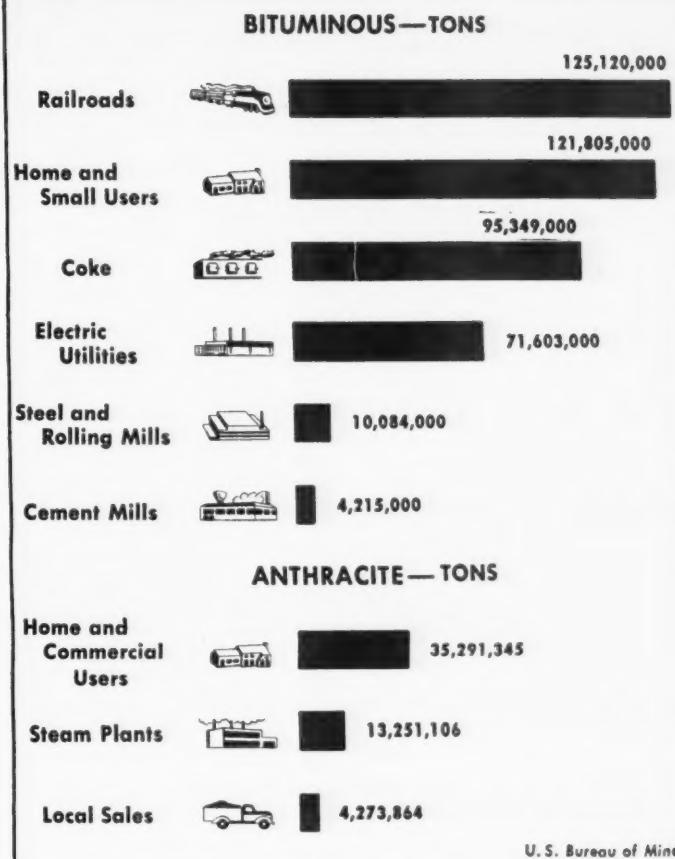


BECAUSE MUTUAL UNDERSTANDING between men and management builds cooperation and speeds coal-mining progress, Coal Age has prepared this article for coal companies and supervisors who face the problem of stimulating miner cooperation and good will. Pocket-size preprints in pamphlet form for distribution to employees may be secured from the Coal Age editorial department at a price of 15c each for 999 copies or less; 12c each for 1,000-1,999 copies; and 10c each for 2,000 or more.

## HOW COAL IS USED IN YOUR HOME

		
A pair of shoes 3 lb.	A pair of Nylons 6-10 lb.	An electric refrigerator 337 lb.
		
A cooking range 300 lb.	A can opener 1 1/2 lb.	A dishpan 9 lb.
		
A coffee pot 4 1/2 lb.	An automobile 4,500 lb.	Electric light for a year 600 lb.
		
Breakfast toast for a year . . . 45 lb.	Coffee for a year 75-100 lb.	Radio for a year 150 lb.
		Materials for home-building . . . 8,000 lb.
Sewing machine for a year . . . 15 lb.		

## WHO USES COAL AND HOW MUCH — 1945



# Coal Mining Job

homes, as long as trains pull passengers and freight, we'll need coal — lots of it. Competitors we have, but coal remains perhaps the most important basic material this country possesses.

What about coal's future? Wartime and postwar demand naturally is tapering off, although 1947 still will be one of the big years in coal history. By 1950, according to some authorities, tonnage will be back to around 525,000,000 a year in the bituminous industry — about the same as it was in 1946. But 525,000,000 tons still is good. It means at least ten weeks more work per year than you had in the five years just before the war — ten weeks at a lot higher wages.

In anthracite, an output of 60,685,000 tons in 1946, more than 10 percent above the 1945 figure, is a healthy sign. As in bituminous, the future production level should be well above the average in the five years before the war, provided everyone does his part.

### Good Business Ahead for Coal

To make the picture brighter, your company and your industry are hustling to find new uses and new markets for coal, new machines for mining coal more

easily and efficiently, new ways to hit competitors and new ways to make your job safer and better.

All this adds up to something good: a busy coal industry — the key to a higher, steadier income and a better living for you. But it is not all smooth sailing. Coal still has a lot of big problems — cost, competition and so on. You can do a lot to help find the answers — and thus make your job better.

### You and Coal's Competition

If coal were the only fuel, you and your company could sit back and take it easy. But oil, natural gas and water power have their eyes on coal's markets. They're hard scrappers and they've gained a lot from some of the things that have happened in coal. The big two are cost increases and production stoppages.

Because of these cost increases and production stoppages, plus a hard sales drive, oil and natural gas have grown faster than coal — much faster. Take the years from 1912 to 1945, for example. In this

## HOW COMPETITION HAS RUN AHEAD OF COAL

### ANTHRACITE TONNAGE DOWN NEARLY ONE-THIRD

1912  84,362,000

1946  60,685,000

### BITUMINOUS TONNAGE UP LESS THAN ONE-FIFTH

1912  450,105,000

1946  532,000,000

### OIL UP NEARLY EIGHT TIMES

1912  222,935,000 bbl.

1946  1,731,000,000 bbl.

### NATURAL GAS UP OVER SEVEN TIMES

1912  563,203,000 cu. ft.

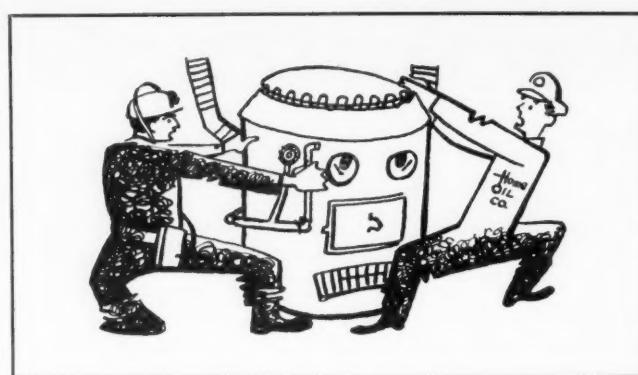
1946  4,000,000,000 cu. ft.  
U. S. Bureau of Mines

period, total anthracite and bituminous production increased a little more than 10 percent. But natural-gas output increased more than seven times and oil almost eight times. That means that coal's big competitors were grabbing off a big chunk of business coal might have had.

### The Buyer Is Your Boss

It all goes back to the fact that the customer is the big boss — not only in your case but in your company's. If he gets mad at coal because of cost, because he can't get it or other reasons, he can buy something else and leave both your management and you high and dry. So you're in it with management when it comes to pleasing the customer.

The diesel locomotive, for example, is racing full speed toward seizing a big share of one of coal's largest markets, the railroads, although the coal industry is working to bring the diesel to a full stop. In 1920, there were no diesels pulling trains. But in 1945, there were more than 3,500 diesels in operation — one-twelfth of the country's locomotive power,



representing a loss of more than 10,000,000 tons a year. Of all new orders for locomotives in 1946, 95 percent were for diesels.

### Oil Heat Captures Home Basements

Not so glamorous as the diesel, perhaps, but equally serious as far as coal is concerned, are oil burners for home heat. At present, about four-fifths of the anthracite and one-fifth of the bituminous tonnage goes for heating — a whale of a coal market. But oil interests are boasting that they will change 1,544,000 homes from coal by 1950, install 561,000 oil burners in new homes and replace 388,000 old burners with new ones.

The oil men expect sales of heating oil to jump from about 110,000,000 bbl. in 1945 to 179,000,000 bbl. in 1950. Since it takes about 4 bbl. of oil to make the same heat as a ton of coal, this means oil could take the place of 17,000,000 tons of coal in the next three years unless the industry, including yourself, can slow it down.

### Natural Gas Muscles In, Too

Natural gas, too, is moving in with big new pipelines reaching farther and farther into coal-burning areas. In 1945, the people of Minneapolis asked for permits to install 5,385 gas burners, 479 coal stokers and 282 oil burners. In May, 1946, St. Paul citizens voted 8 to 1 in favor of bringing in natural gas to replace coal and manufactured gas made from coal. Main reason for the vote: uncertainty of coal supplies due to work stoppages. Natural gas in St. Paul will mean the loss of a million tons of coal a year.

Not long ago, the Big and Little Inch pipelines, built during the war to carry oil from Texas to the East, were sold to bring natural gas to Ohio and other eastern markets, including possibly New York. At full capacity, these lines will supply gas equal to 6,500,000 tons of coal a year.

### How Coal's Competitors Threaten Your Job

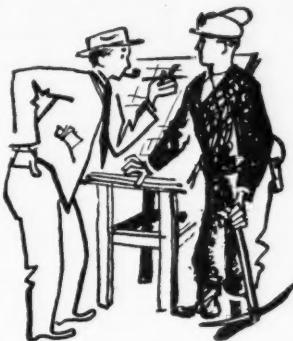
What does this mean to the coal industry and to you? Loss of a million tons of coal means loss of a year's work for some 700 bituminous or 1,500 anthracite miners. Even 6 tons lost means a day's work for a bituminous miner and 3 tons lost is a day's work for an anthracite miner.

The oil and gas situation is nothing to cheer about. Neither should we lose all hope. Coal-mining management is taking steps to build up the industry's competitive power. For some of these steps and what you can do to make them more effective, read on.

# You and Your Management

As a coal miner, you're part of a production and selling team. The stockholders put up the money to open your mine. The management looks after production, preparation and sales. You get the coal out. How well everyone, including you, does his part has a great effect on the success of the partnership.

Let's suppose you found a likely place and decided you wanted to open a little mine yourself. Perhaps you could pay the owner so much per ton as you mined and thus wouldn't have to buy the coal outright. First, though, you would have to have something to mine with — at least some picks, shovels, perhaps a cutting machine, a drill, a mine car or so and some kind of a screen and perhaps a storage bin. These would have to be paid for.



## You Need Money to Open a Mine

Perhaps you could put up the money yourself, maybe you could borrow or have your friends buy stock, which is the same thing. Naturally, you would expect some return on that money — perhaps at least 6 percent. You would expect to get it by producing at a cost that would permit you to sell at a profit.

In other words, before a single man went on the job or a ton of coal came out, you would have to put up money to get the mine open and supply the tools and equipment so that man could work. You might have to hire somebody to manage the mine for you while you were out drumming up business or maybe you would have to hire a salesman. Then, if your cost was low, you could figure on getting business and holding it against other coal producers and people selling other fuels.

But you could get low cost only if your men worked well. If they didn't, and you couldn't convince them that they should, you would be up against it because your cost would be too high. Your competitors would take the business and you wouldn't have any jobs left to offer.

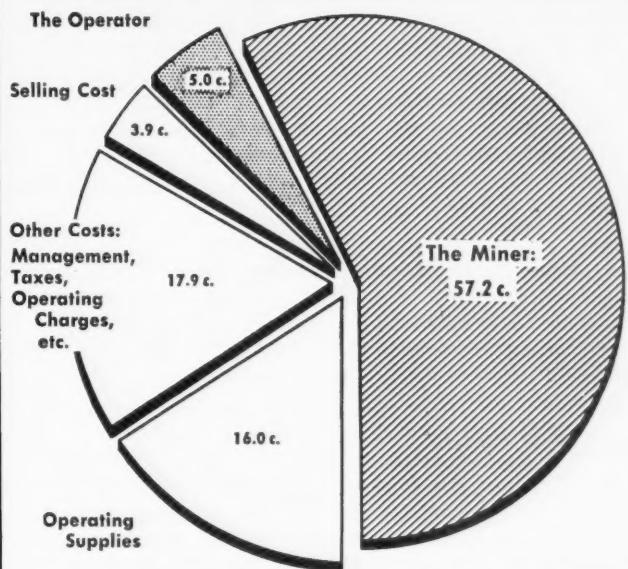
## How Your Company Started

The situation is no different with the company you work for. Somebody put up a lot of money to make a job for you — more than \$10,000 per man working in your mine. Somebody picked managers and salesmen, put in machines and methods and set up an outfit they hoped would get out quality coal at a cost that would permit good business at a fair profit. Finally, they asked you to come in and help mine and prepare the coal, asking only that you do your part to help get high tonnage, a low cost and high quality, thus making it possible to run every day, earn a fair profit and pay you good wages.

The picture is clear. Coal mining is a partnership and you are one of the partners, responsible for helping get the low cost and high quality that good business has to have. The stockholders put up the money without which there would be no mine and

## DIVIDING THE PIE —

WHO GOT THE BITUMINOUS COAL DOLLAR IN 1945



In anthracite, the miner gets around 65c. out of every dollar received. The industry would have gone in the red in 1945, if there hadn't been some income from sources other than selling coal.

Office of  
Temporary Controls (OPA)

no job. Would a 6-percent profit, or margin, be too much? In 1945, according to OPA figures, the "net margin" of the bituminous industry was 5 percent. In anthracite, in the same year, the "net margin" was 6 percent but, if the industry hadn't picked up a little change from some other investments, it would have lost about 3c. per ton. The picture probably is not any better today.

## Where the Money Goes

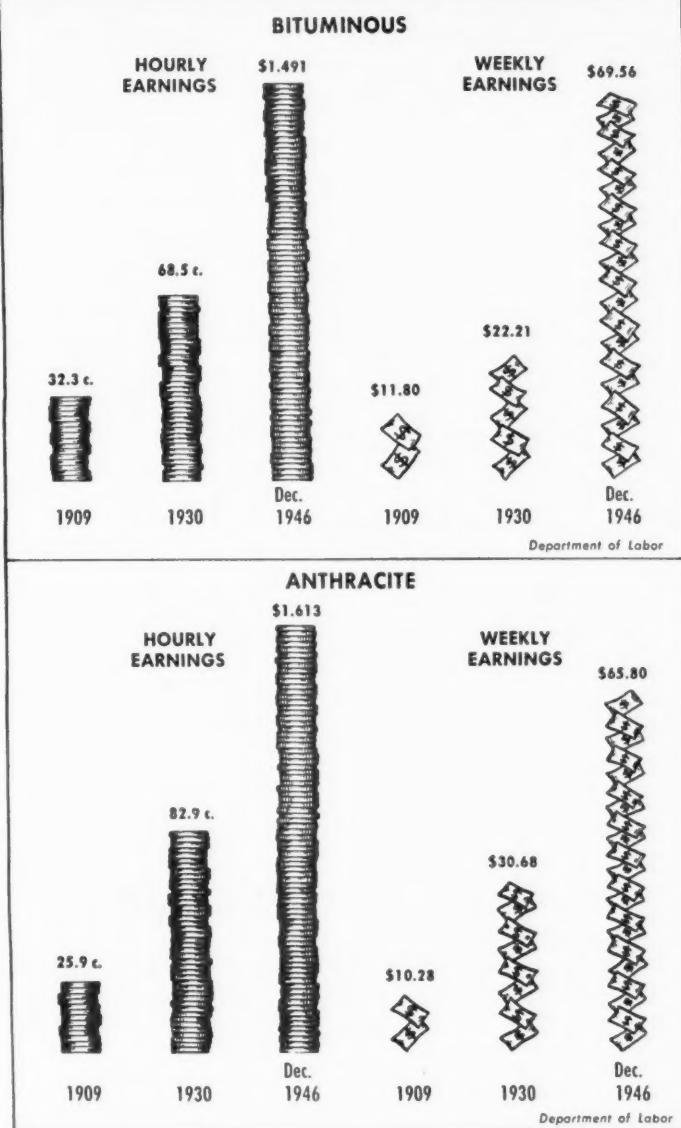
Getting down to facts, you get the lion's share of every dollar your company takes in. In 1945, according to those same OPA figures, you got 57.2c. out of every dollar if you were a bituminous miner. The company got 5c. to be divided among its owners and re-invested in machines and new properties. The rest went for such things as managerial wages, selling expenses, power, materials and supplies, taxes and so on. If you were an anthracite miner, your take from every dollar was around 65c. and the company got 6c. in 1945.

As a matter of fact, as long as you are sharing well in the returns, doesn't it make sense for you to want the company to make good money? When it makes money, it is a sign that it's in a strong position in the market because it has a low cost. When it has a good margin of profit, it can pay better wages and still have plenty of money, after paying its stockholders, to buy new equipment, improve the mine and preparation plant and thus keep ahead of competitors. That means a better job for you, with steadier work and everything. So you should be very much interested in seeing that your company makes good money because it means a better opportunity for you.

(Continued on following page)



## HOW COAL HAS BOOSTED YOUR EARNINGS



product as the same raise on the price of yours. That, in a nutshell, is one of coal's biggest problems.

Your management wants you to get high wages. To keep on paying them and at the same time stop increases from going straight on to customers, your company is putting a lot of money in modern machinery to help you get out more coal for what you receive.

But up to now, in spite of this costly new machinery, your wages have been rising faster than the tonnage you get out a day. Your hourly pay, according to government figures, went up 80.9 percent between 1930 and 1945 in the bituminous industry and 49 percent in anthracite. You have had other increases since 1945. But in that same period, your daily coal output increased only 14.2 percent in bituminous and 26.2 percent in anthracite.

### What Makes It Tough for Coal

That's the main reason why bituminous coal rose from an average price of \$1.90 per ton at the mine in 1930 to \$3.06 in 1945 and \$3.46 in 1946; anthracite from \$5.52 to \$6.26 in 1945 and still higher in 1946. As stated, the only reason prices didn't shoot

up a lot more is the money your company spent for modern machinery and methods. And while coal went up a lot, oil rose only 3c. a barrel—from \$1.19 in 1930 to \$1.22 in 1945. Natural gas actually dropped: from 7.6c. to 5.1c. per thousand cubic feet at the wells.

This has meant tougher going for coal—harder selling, business lost that might have been gained or kept, and less working time for miners. Management is not against high wages. It wants to see your earnings kept as high as possible. But when you get a wage increase without putting out more coal, something has to happen, meaning that the price goes up, giving competitors a better toehold.

### The \$64 Answer

The answer is more tons per day. That means a low cost in spite of high wages. In fact, it is the only way high wages can be paid. Otherwise, your rates would be high but you would get less money during the year because loss of business would cut working time. So, you would be living poorly in spite of a high hourly or daily rate. It has happened in some other industries and it is something really worth thinking about.

With American machines and methods—the best on earth—American workers turn out more goods for sale at lower prices than anybody else in the world. This sets the stage for the highest wages in the world—and for more and better machines, which in turn pave the way for a better living. More production per minute or per hour or per day means more business, which is the real road to more things to eat, wear and use per person.

### How Machines Boost Your Earnings

Efficient production means not only higher wages and good profits. In the end, it is the key to better living. That is why coal operators are spending big money for modern mining machines. Used the way it should be, the machine helps you to boost your output and earn more money, while it allows your management to do more business and thus have a better chance of earning a fair profit.

Look at the British miner. Working in a typical mine, without the equipment you have, he turns out about 1.3 tons per day, against your 5.8 tons if you are a bituminous man or 2.8 tons if you work in anthracite. In 1946 he averaged about \$23 a week, against your \$58.03 in bituminous and \$57.15 in anthracite. Last December and since, you have been doing even better. In December, you averaged \$69.56 a week if you were a bituminous miner and \$65.80 a week if you were an anthracite man.

### Low Costs Pay Off

Coal cost is not a problem for the operator alone. It means a lot to you, too. High cost means high prices. High prices mean less business after competitors have their innings. Less business means less working time for you.

But if you turn out more tons per day, by using your shovel or your machine better and working with your management, cost comes down and the company can have a good business and you can have better working time and higher earnings. That is the reason for the machine and that is why management asks you to work with it in getting out more coal per day.

*(Continued on following page)*



## You and Coal Selling

Coal's customers, in the long run, decide how your company—and you—fare in business, profits and earnings. A customer's thinking is colored by a number of things. Here are some of them:

1. Price.
2. Quality and suitability.
3. Regular and dependable supply.
4. Equipment the coal is burned in.
5. Skill in salesmanship.
6. Service to the customer.

You and your management are partners in pleasing coal's customers and nailing down the business. If you work your best along with management, you can help cut down costs and give your company's salesmen something they really can use in beating off oil and gas.

You can do your share to see that your mine ships clean, well-prepared coal. With better coal that serves his purpose better, the customer gets more for his dollar. When that happens, coal is more able to keep its old friends and make new ones.

### What Happens When Work Stops

Above all, you can work to make sure that coal never loses a customer unnecessarily because there is no coal to buy. That means thinking before you stop work. Stoppages have caused a lot of customers to change fuels lately. Not long ago, for instance, the manager of a New York hotel corporation announced two switchovers to oil. "With the higher prices that usually follow a strike," he said, "oil is no more expensive than coal—and we can always get it." Put yourself in your customer's place. What would you do?

The truth is, every time coal production stops, your job is put in danger. You earn only when you work and you work only when people buy coal. If, because you stop work, enough people stop buying coal and go to gas or oil, you are quite likely to be on short rations or out of a job entirely. That's the open and shut of it. So, the watchword should be: "Is this work stoppage really necessary?"

### Scientists on the Job for Coal

Coal companies are pooling more than half a million dollars a year to find new uses for coal in the home and in industry and to make present methods of using coal better. This doesn't count the money spent by individual companies and outside research concerns.

Bituminous Coal Research, Inc., and the Anthracite Institute are shooting for pushbutton heating

equipment to lick the oil and gas burners. They're fighting smoke and fly ash. They are inventing new coal burners that are more convenient, smokeless and cheaper to operate. They're turning coal into oil and gas to get a second shot at competitors. They're improving mining methods, coal preparation and safety devices to make work easier and safer and produce a cheaper, cleaner fuel. They're building a coal-fired gas-turbine locomotive that will lick the diesel.

Your industry is beefing up its research and sales attack with more and better advertising and a growing group of sales experts and service men. Coal producers are working hand-in-glove with manufacturers and dealers to turn out better burning equipment and get more of it sold and put in people's basements, because this means better-pleased customers and more coal sold.

### Better Service for Home Customers

With an eye on the household trade—a big chunk of coal's market and a big target of competitors—companies like yours have joined up with retailers throughout the nation to give better service to coal-heated homes. This makes good sense, because the user is likely to judge your product by how he gets along with the retail dealer, who really is your agent.

A number of community coal-service groups already are working along this line, backed up by several hundred thousand dollars from coal-mining companies. These service groups are guided by a nationwide code of standards for furnace firing, heating-plant care, clean coal deliveries, trouble shooting 24 hours a day, friendly relations with users and a pooling of advertising know-how. The goal is coal heat in 55 percent of America's present homes and a new market for 30 to 40 million tons a year in new homes.

Nobody expects you to leave your job and ring doorbells to sell coal. But every ton that is sold is important to you because it means more work and more wages. You can help sell without leaving the mine—by doing all you can to turn out good coal at a low cost, with no production stoppages. That way, you back up your management, your salesmen and your industry's research men, building up business for coal and bringing about a better opportunity for yourself.



## You and Mine Safety

Because of progress over the years, you are a lot less likely to be hurt in your daily work in and around the mine. Between 1930 and 1946, for ex-

ample, you, your management and state and federal safety officials cut the number of deaths in mining a million tons of bituminous coal from 3.463 to 1.425; in anthracite, from 6.40 to 2.801. In other words, less than half as many men are getting killed in mining coal now as in 1930. But you still are more likely to get hurt or killed than miners in almost any other country in the world—unless you and your management increase your efforts to make coal mining safer.

### Your Part in Safety

Management has a lot to do in making your work safe. So have state and other safety officials. That doesn't excuse you, however.

Let's look at it this way. You own a car. The state and town where you live have laws on driving. They put up stop lights, warning signs and guard rails. But do they say: "O.K. Joe. Just drive and pay no attention because we will keep you safe"? Of course not. In spite of all the laws and safeguards provided by the state and by towns and cities, you are expected—in fact, required—not only to look where you are going but to look out for other people.

### Who Makes Your Mine Safe?

The same thing is true in coal mining. The operator alone cannot make your mine safe. Neither can state or other officials, no matter how many laws and rules they make. But all of them play vital parts in safety. They can't do it all because, as in driving, you also must do your part. If you're careless, if you break the rules, if just don't give a damn, trouble will happen sooner or later, in spite of everything anybody else does to make coal mining safe.

When you come right down to it, keeping safe is just as much your job as anybody else's. On top of that, you've got a bigger stake in safety than anybody else. If you want safer mining, you have to do your part to finish the job being done by your company and the officials. Study your job to see what you are doing that may be wrong. Talk it over with your boss and with the safety director or engineer. Learn the law and the company rules. Take first-aid training if you haven't had it. All in all, make safety your first thought. It will pay off.



## You and Your Future

As a coal miner, you can look ahead to a pretty good future, especially if you do your part in meeting the problems facing both you and management. People are going to keep on needing coal to run railroads, make electricity and gas, manufacture shoes and steel and make aspirin tablets and other things. Fairly soon, too, a lot of coal is going to be used in making gasoline and oil, believe it or not. The industry is working hard on that and is meeting success. It's going to take more and more energy, of which coal is the biggest source, to meet growing demands for more things for better living. This means an even better chance for coal.

There's been some sense and a lot of nonsense talked about atomic energy, but the way things look now it won't take the place of coal in our lifetime. Oil and gas, however, will remain real threats for some time, even though coal before long will have something to take their places.

Your industry and your company are working hard to put coal in a better spot. They are spending money for research. They have a big selling program under way with a lot of punch. They're putting new machines in the mines to make your job easier and get the low cost that is coal's biggest talking point.

On your side, your wages are higher than ever, you can expect steady work for a long time to come and your job is getting safer year by year. In addition, you have skills that make you a pretty important guy on the mining team.

### You Can Bet on the Future!

Add it all up and you can bet on the future, especially if you pitch in and help as you can. That means at least four things:

1. Getting out more tons per day to cut cost.
2. Sending high-quality coal to the customer.
3. Staying on the job so that customers will never be out of coal.
4. Working with your company, with state and other officials and with your union to make your job a safer and better one in every way.

What's in it for your industry, your company and—especially—you?

1. Higher earnings and a better living.
2. Steadier work under better conditions.
3. A higher standing with the public and your customers.
4. A bigger share in a forward-looking and prosperous industry.

### COAL MINING IS SAFER— YOU CAN MAKE IT MORE SO

#### FATALITIES PER MILLION TONS

1930       3.463

#### BITUMINOUS

1946       1.425

1930       6.40

#### ANTHRACITE

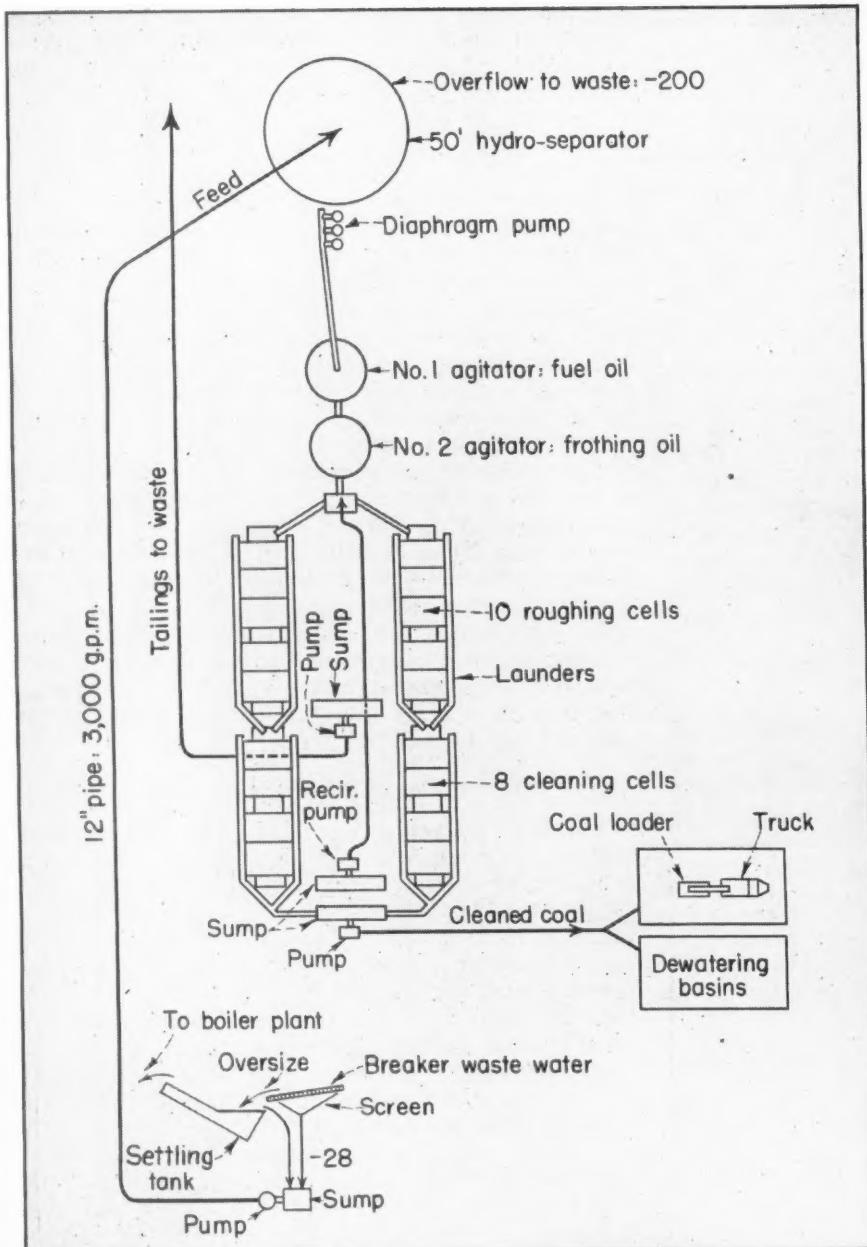
1946       2.801

U. S. Bureau of Mines

# OIL FLOTATION

## Cleans Silt Cheaply and Efficiently

Producing Revenue for the Company and a Better Fuel  
for a Power-Plant User, New Susquehanna Flotation Plant  
Cleans Minus 28-Mesh Silt—Recovery 65 Percent with an  
Ash of 13 to 14 Percent



Flowsheet of the oil-flotation plant at Susquehanna No. 7 colliery.

CHOICE of a flotation plant to recover and clean minus 28-mesh anthracite not only solved the problem of complying with commonwealth laws governing stream pollution at No. 7 colliery of the Susquehanna Collieries Co., Nanticoke, Pa., but also opened up a new supply of coal for pulverized firing and a new source of revenue for the company. About 65 percent of an average feed of 320 tons per seven-hour day is recovered and the ash reduced to 13 to 14 percent in 18 flotation cells—ten roughing and eight final cleaning.

The new Susquehanna flotation plant, which went into commercial operation in February, 1947, treats minus 28-mesh anthracite from the breaker waste water and delivers the water to the settling-pond discharge in every way complying with Pennsylvania requirements. Installation of the flotation plant, designed by the Susquehanna engineering staff with various associates, came after several test installations to recover fines and clarify breaker waste water by means of a settling tank and pond.

The rapid rate the pond was being filled and the knowledge that much good coal that possibly might be of use to a consumer with the proper equipment was going into it resulted in a search for both a customer and an efficient method of cleaning the fine material. The customer was found in the new Hunklock Creek generating plant of the Luzerne County Gas & Electric Co., which has contracted for the entire output, and the cleaning method in Steffensen flotation cells supplied by American Cyanamid. These cells employ air only in making the flotation froth, using a mixture of

After preliminary screening to remove too coarse material, the feed to the oil-flotation plant goes into this hydro-separator, where most of the minus 200-mesh overflows to the final settling pond off to the right. The underflow for flotation is pumped out to the flume leading to the plant off to the left.

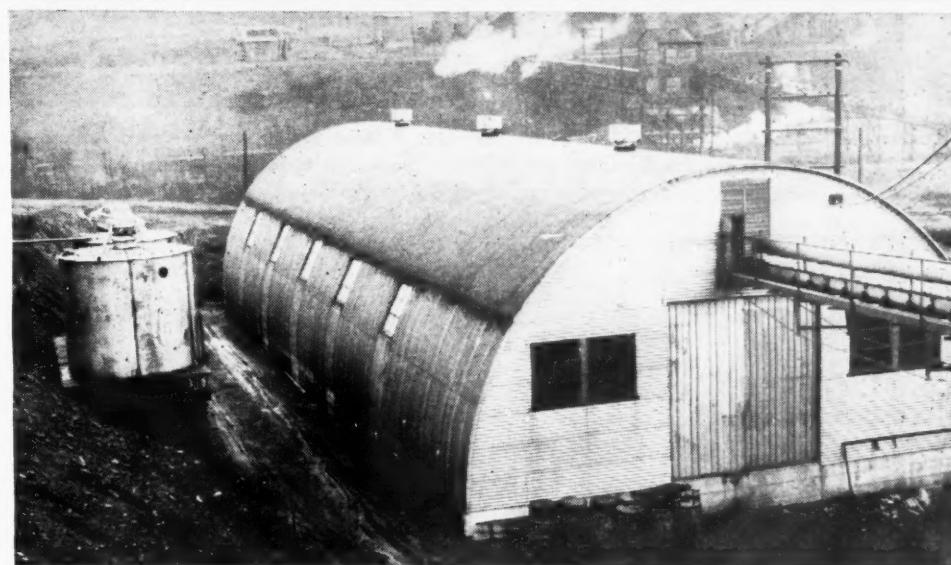
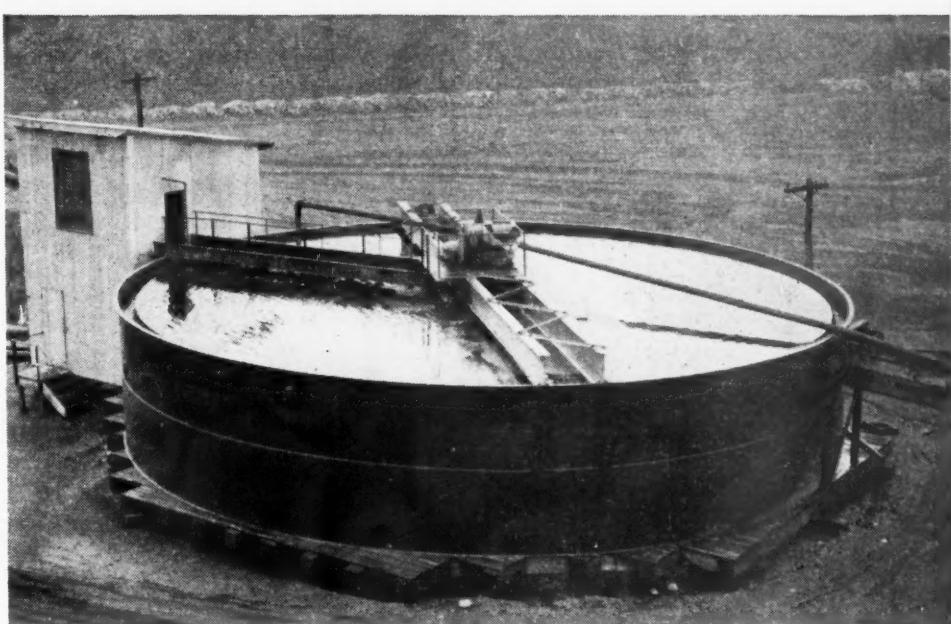
light fuel and pine oils. Coal carried to the top of the liquid by the froth bubbles is removed at each side by rotating froth ejectors into launders leading to a sump. From this sump the coal is pumped to dewatering basins, which also serve as truck-loading stations.

The No. 7 breaker discharges waste water at a rate of about 3,000 g.p.m. The water carries out with it about 850 tons of material in seven hours, ranging in size from No. 4 buckwheat down to zero. In designing the recovery and cleaning facilities, the two major points were: (1) getting the No. 4 and No. 5 sizes, which normally are rejected in the refuse by the flotation cells, out of the feed, leaving the minus 28-mesh; and (2) settling and dewatering the clean coal.

The No. 1 problem was solved by running half the breaker waste water into a 12x40-ft. settling tank and the other half over a high-speed screen, the water and minus 28-mesh also going to the same settling tank. In this way practically all of the No. 4 and No. 5 buckwheat, which the cells ordinarily throw out in the refuse, is removed and conveyed to the stockpile for the colliery power plant. Some 530 tons of the coal carried out in the breaker water in seven hours thus goes to the power-plant stockpile. The other 320 tons, consisting of material 28-mesh and smaller, with a little coarser material, is pumped to the flotation plant.

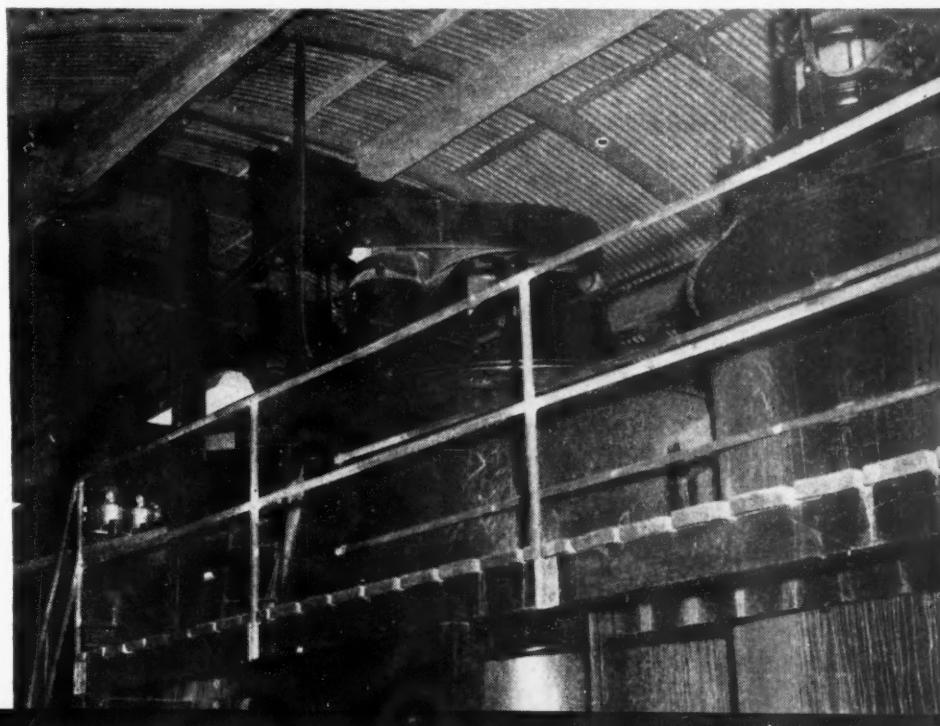
#### Steps in Flotation Process

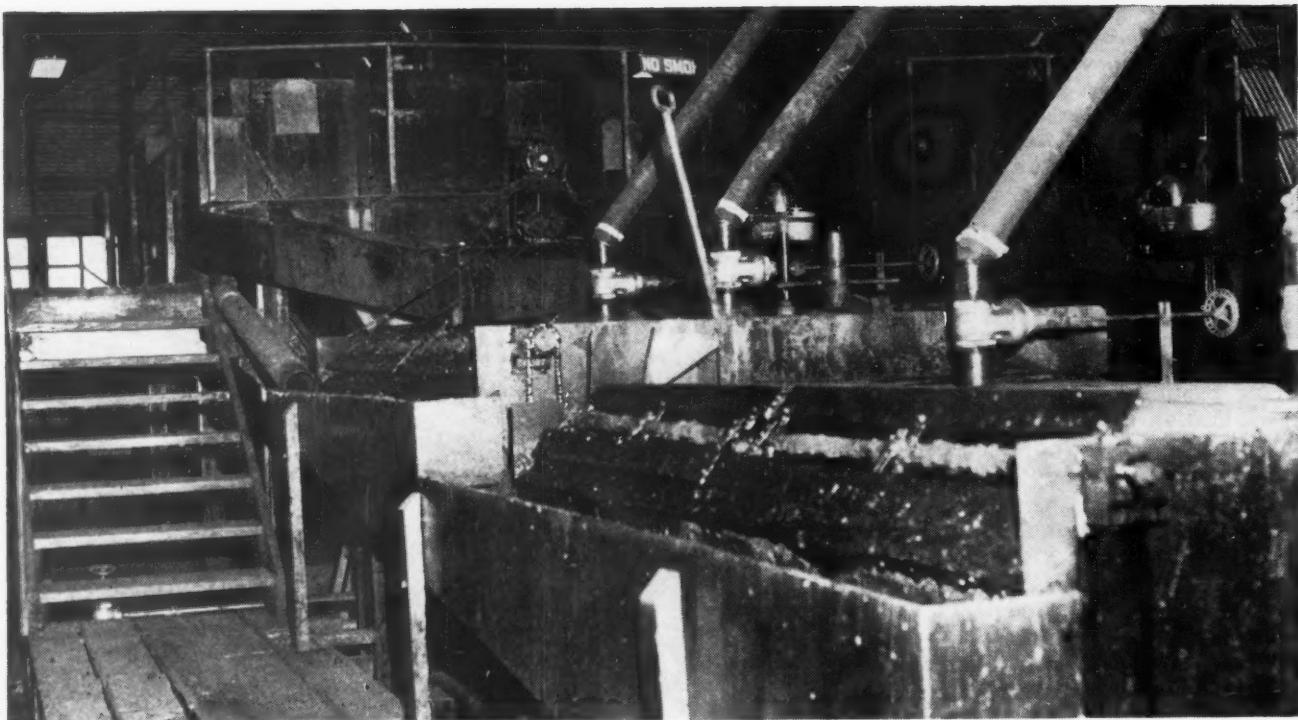
The first step in the flotation process is running the water carrying the minus 28-mesh feed into a Hardinge hydro-separator 50 ft. in diameter and 10 ft. high. The overflow into the launder around the top of the hydro-separator, which carries most of the minus 200-mesh material, flows to a settling pond which performs the final water-clarification job. The remaining 300 to 350 g.p.m. out of the original 3,000, carrying the plus 200-mesh material, is removed from the bottom of the cone and elevated to a flume feeding the main plant by a Denver Equipment Co. 6-in. triplex diaphragm pump. The stroke is adjustable to vary the percentage



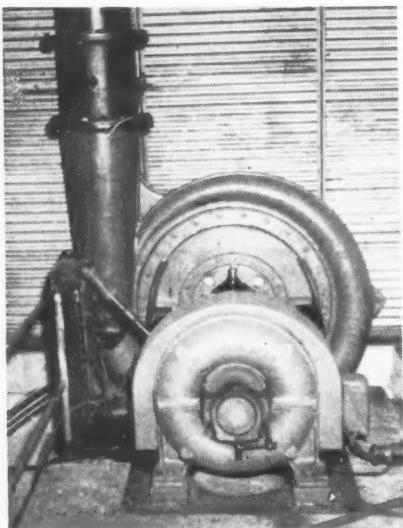
A Quonset-type building provided good low-cost housing for the flotation units. Coal to be treated enters at this end. The two reagent storage tanks are at the left.

Prior to flotation, fuel oil is mixed with the coal and water in the No. 1 agitator (right) followed by pine oil in No. 2 (left).





One-half of the flotation section at Susquehanna No. 7. After preliminary treatment in the five roughing cells in the rear, the coal receives final treatment in the four cleaning cells in front. Clean coal is removed from the tops of the cells to launders alongside by rotating paddle-type froth ejectors. Air for frothing comes in through the hoses to the tops of the cells.



Air for frothing is provided by this 150-hp. rotary blower.

Cutaway view of a flotation cell of the type used by Susquehanna, showing flow of air, bubbles and cleaned coal.

of solids in the water fed to the flume.

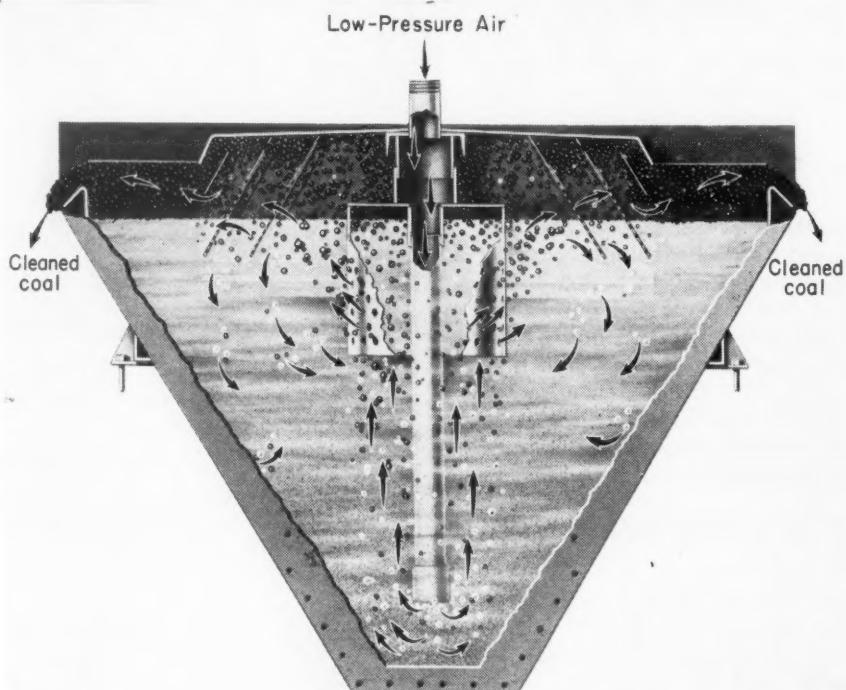
From the flume the water, carrying about 40 percent solids, goes first into an 8x8-ft. agitator, where it is mixed with the first of the two reagents used—fuel oil. The quantity is varied in accordance with the quantity of solids in the feed. The mixture then goes to a second agitator, where pine oil is added. The quantity again varies in ac-

cordance with the feed. However, reagent cost averages about 7c. per ton of clean coal.

From the agitator the pulp—to give it its technical name—goes into a small mixing tank, where water is added to reduce the solids content to about 20 percent. The diluted pulp then goes to the roughing cells and from them to the final cleaning cells.

Ten Size 60 Steffensen roughing

cells were installed in two banks of five each, the feed being split between them. Each bank of five roughing cells is followed by a bank of four Size 60 Steffensen cleaner cells. In practice, however, it was found that coal from the first two roughing cells was satisfactorily cleaned and, consequently it is bypassed around the cleaner cells by an auxiliary launder, or flume. Air for frothing purposes is brought in





On a recent inspection of the flotation plant (left to right): E. T. Powell, mining engineer, Susquehanna; Dr. E. H. Smoker, research engineer, United Gas Improvement Co.; W. E. Weineck, Susquehanna colliery superintendent; C. E. Warsaw, president, Luzerne County Gas & Electric Corp.; James Prendergast, president, Susquehanna; C. A. Gibbons, vice president and general manager; G. E. Cleaver, colliery superintendent; C. H. Matthews, electrical and mechanical engineer; Joseph T. Jimison, mechanical engineer; and O. E. Matter, manager, electrical production, Luzerne County Gas & Electric.

by headers in the top of the plant, with hose connections to each cell, thus simplifying installation and maintenance.

Each cell is equipped with an "air-miser" dispersing arrangement to keep the quantity down and thus reduce the operating expense. Each cell requires about 350 c.f.m. and all 18 are supplied by a 150-hp. 3,550-r.p.m. Allis-Chalmers motor blower rated at 7,750 c.f.m. at a pressure of 2.6 lb. per square inch. Since total cell requirements is 6,300 c.f.m., the blower has sufficient, but not excessive, reserve.

#### Disposal of Tailings

Tailings, or refuse, from the roughing cells are pumped to the final settling basin by a 300-g.p.m.-diaphragm pump, also Gardner-Denver. Tailings from the cleaner cells are pumped back to the mixing box following the agitators by a similar 200-g.p.m.-pump. The tailings in both cases include a large part of any minus 200-mesh material which gets through the hydro-separator and which is settled out, leaving the water clear, in the final disposal pond. Since the water carrying the cleaner-cell tailings normally does not provide sufficient dilution, make-up water is added in the mixing box as necessary.

Clean coal from the cleaner cells—and the first two roughing cells—is delivered alternately to two settling and loading basins by a 400-g.p.m. pump. The basins were made by excavating in suitable locations and flooring them with "red

dog." A gate with removable timbers permits a Barber-Greene loader to enter when the basin is filled to the desired point and place the dewatered coal into trucks to be hauled to the Hunlock Creek plant. The water is siphoned out of the basins, each of which will accommodate a month's production of cleaned minus 28-mesh coal. Since the height of the head on the loader is adjustable, it can be raised sufficiently to avoid digging into the red-dog floor of the basins.

After dewatering, the cleaned coal has a surface moisture of around 13 percent. Additional equipment is installed at the power plant for further drying before pulverizing.

#### Samples Show 13.91 Percent Ash

A sample of the cleaned product from the flotation plant taken March 6, 1947, showed an ash content (dry basis) of 13.91 percent and a size distribution as follows:

Over 3/64 in. ....	5.36 percent
Over 28-mesh ....	10.15 percent
Over 200-mesh ....	78.11 percent
Through 200-mesh....	6.38 percent

Although it was not contemplated that the plant would handle material larger than 28 mesh, some is carried over and the cells, as noted, clean a part of it. They also clean a part of the minus 200-mesh material, although they were not expected to do so and the plant was laid out to bypass as much of this size as possible to the final tailings,

or refuse, settling pond. In contrast to the composite ash of 13.91 percent in the March 6 sample, the ash in the feed, by sizes, usually runs about as follows: plus 3/64 in., 17 percent; 3/64 in.x28-mesh, 14 percent; 28x200-mesh, 39 percent; minus 200-mesh, 50 percent.

#### Quonset-Type Building Used

A Quonset-type building, manufactured prefabricated by the Great Lakes Steel Corp., was selected for the No. 7 flotation plant, with the top 90 deg. insulated for better heating. In addition to being very low in cost, the building has proved entirely satisfactory in all other respects. Auxiliary steel columns were placed inside to support crane rails on each side for handling the equipment.

The flotation plant, which is operated seven hours per day, is run by two men, with a third operating the truck loader. The power cost, on the basis of a cleaned-coal output of 30 tons per hour, runs approximately 10c. per ton. In view of the successful record of the No. 7 plant, Susquehanna is preparing plans for another flotation plant at its Glen Burn colliery, and aside from some proposed changes in the preliminary sizing facilities, on the basis of experience at No. 7, the Glen Burn plant will use the same equipment and function the same as No. 7. The flotation product at both No. 7 colliery and Glen Burn colliery is sold by the Susquehanna Collieries Co. under the trade name "Pulvacite."

# THREE-WIRE SYSTEM

## Ups D.C. Voltage at Gay Mining Co.

Power Transmitted at Double Voltage at Which Loads Operate — Face Voltage Consistently High — Track Serves as Neutral Conductor — Voltage to Ground No Greater Than for Two-Wire System

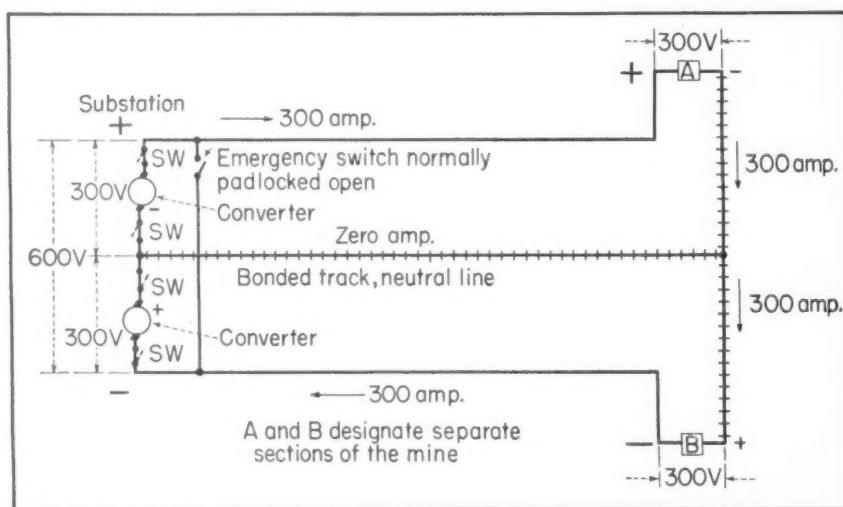
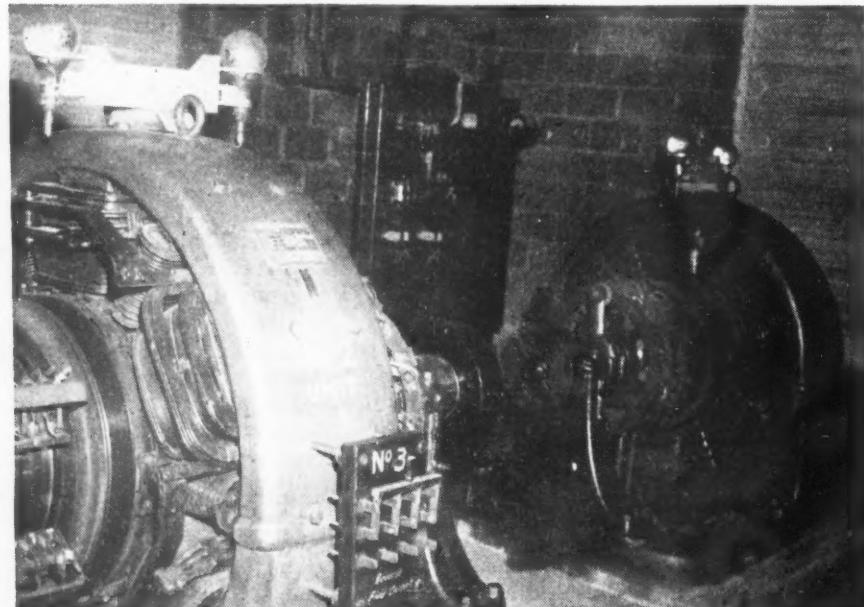


Fig. 1—Schematic wiring diagram of a three-wire d.c. system with substation feeding two separated but balanced loads—no current returning through the track.



Two 250-kw. 300-volt synchronous converters located in the same substation make an ideal arrangement for supplying a three-wire distribution system. Notice the glass-ball-type fire extinguishers mounted on each converter.

MAINTENANCE of good d.c. voltage, an important requirement in boosting efficiency, helped the Gay Mining Co., Gilbert, Mingo County, W. Va., set top records of production per man-shift in West Virginia during the war. A three-wire d.c. distribution system, along a 4,800-ft. haulageway between the substation and a point where the circuit branches, has reduced the voltage loss to 70 percent and the energy loss to about one third that of the conventional two-wire 275-volt system using the same copper.

This three-wire d.c. distribution system is patterned after the Edison three-wire system, which was devised to enable distribution to be carried out at double the voltage at which the loads operate. The Edison system, nominally 120-240 volts, still is used in the congested business sections of some large cities. Since the distribution voltage is double the voltage at which the loads operate, a substantial saving in copper and  $I^2R$  losses is possible. The third wire is called the neutral wire because it is grounded and therefore is at zero potential. In the Edison systems used in cities, the positive wire is at a potential of 120 volts above ground and the negative wire 120 volts below ground. The neutral wire carries only the unbalanced current and therefore, may be considerably smaller than the others.

### Converter Connections

The schematic wiring diagram (Fig. 1) shows the substation converters and how they are connected to the mine load. As indicated, with balanced loads there is no current in the track or grounded neutral. Ordinarily the load on the two sides of the circuit is unbalanced. When an unbalance exists the track circuit or neutral carries the amount of unbalance. While the mine is nominally a 275-volt operation, the rotary converters are actually adjusted to approximately 300 volts or the maximum considered practicable to apply to equipment insulated for 275 volts.

Direct current power is supplied by one stationary substation consisting of two 250-kw. synchronous

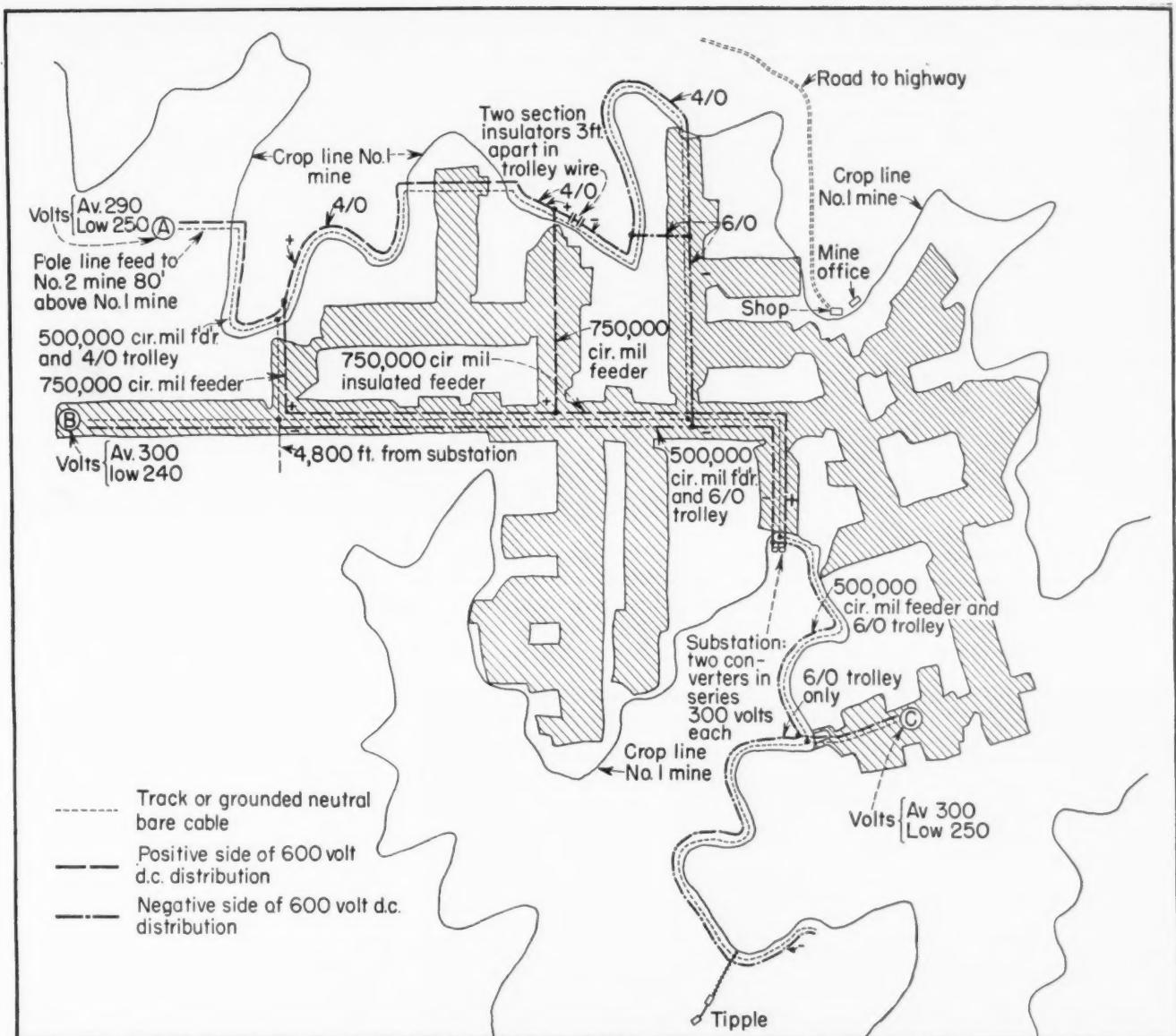


Fig. 2—How the three-wire 300-600-volt d.c. Edison-type distribution system is arranged for feeding the working sections of two operations in separate seams.

converters connected in series and generating 600 volts. This is the potential between the two insulated feeders leaving the substation, the potential of one feeder being 300 volts above ground, the other 300 volts below ground. The track or neutral conductor is connected to the tie line or bus between the two converters. This completes the substation hook-up of an Edison three-wire system where the maximum operating voltage from either feeder to the track is 300 volts.

#### Operating Single Converter

In the event that a converter breaks down or it is desirable to operate only one converter during a light-load period, either converter can be disconnected from the circuit and a feeder switch, normally padlocked open, can be closed to

energize both mine feeders from the converter in service.

A mile-long tramroad that follows the crop line connects the drift portal of No. 1 mine, site of the substation indicated by the legend on the map in Fig. 2, and the headhouse overlooking the tipple and preparation plant. Shaded areas on the map indicate areas being developed or that are already developed. Few rooms have been mined and no pillarizing has been started. The No. 2 mine has been opened in a seam 80 ft. above the seam worked by the No. 1 mine. The small circle marked "A", upper left corner of Fig. 2, shows the location of the load center, which is supplied from the substation at the portal of the No. 1 mine already mentioned. Loads "A" (No. 2 mine) and "B" (No. 1 mine), each consisting of one mobile trackless loading unit

delivering to mine cars, stem from the main haulageway at a point 4,800 ft. from the substation and practically balance one another.

#### Trolley Wire Sectionalized

It will be noted that the trolley wire for the tramroad along the No. 1 mine crop line, upper part of Fig. 2, is sectionalized. The left section is fed from the feeder which is 300 volts *above* ground and the right section from the feeder which is 300 volts *below* ground. The two sections must, of course, be kept separated. The sectionalizing point, about halfway along the tramroad, consists of two trolley wire section insulators with a 3-ft.-long dead block in between.

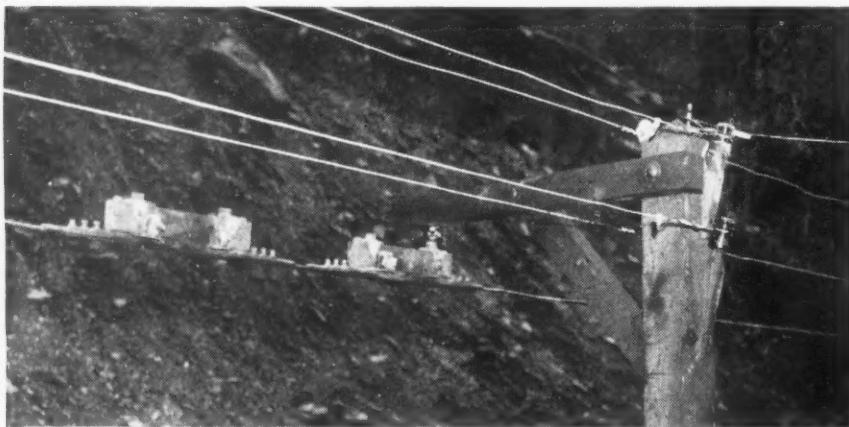
Only along one entry in the No. 1 mine are the two outside legs of the three-wire circuit installed



This feeder switch is padlocked in the open position as long as both converters are in service. The switch is closed only to energize both outgoing feeders from one converter, after the other converter is disconnected from the circuit.



Arrangement of the trolley and feeder circuits along the 4,800-ft. haulageway. The potential of the 750,000-cir. mil feeder, on the left, is 300 volts above ground. On the right, the 6/0 trolley and the bare 500,000-cir. mil feeder, connected in parallel, are at a potential of 300 volts below ground. The track, of course, being the ground, or neutral conductor, completes the three-wire system.



Two section insulators in series, shown also in the upper part of Fig. 2, form a 3-ft.-long dead block in the trolley for the tramroad. The potential across the dead block is 600 volts.

near each other. One leg consists of two bare conductors in parallel, the 6/0 trolley and a 500,000-cir. mil feeder, hung close together on one side of the track. The other leg, a 750,000-cir. mil cable, with a potential above ground of 300 volts and 600 volts above that of the other leg, is covered with weatherproof insulation and taped at the splices. The splices were taped to prevent accidental contact with the live parts of the conductor and to discourage anyone from making an unauthorized connection at a splice.

#### Voltage Surveys Show Results

Voltage surveys made by the West Virginia Engineering Co., electrical consultants for the company, substantiate the statement that voltage in the working sec-

tions of the mine is good. Quoting from one such inspection report, F. E. Vincent, superintendent, said that in section "A" of No. 2 mine the average voltage is 290, the lowest 250. In section "B" of No. 1 mine, he stated, the average is 300 volts and the lowest 240; in section "C" of the same mine the respective voltages are 300 and 250.

The statement that the three-wire distribution system at this property cuts the voltage loss to approximately 70 percent and reduces energy loss to about one-third should be explained. Theoretically, with the same copper, a balanced three-wire system reduces voltage loss by 50 percent and energy loss to one-fourth that of a two-wire system. The discrepancy lies in the fact that had all the copper been used in the positive of a

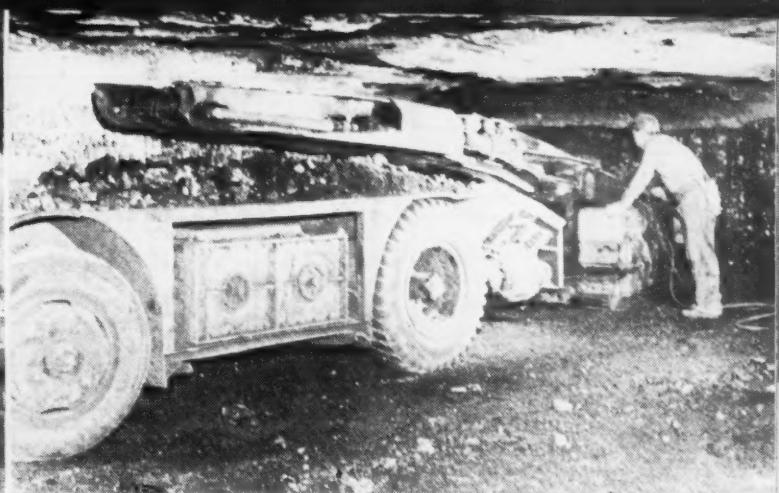
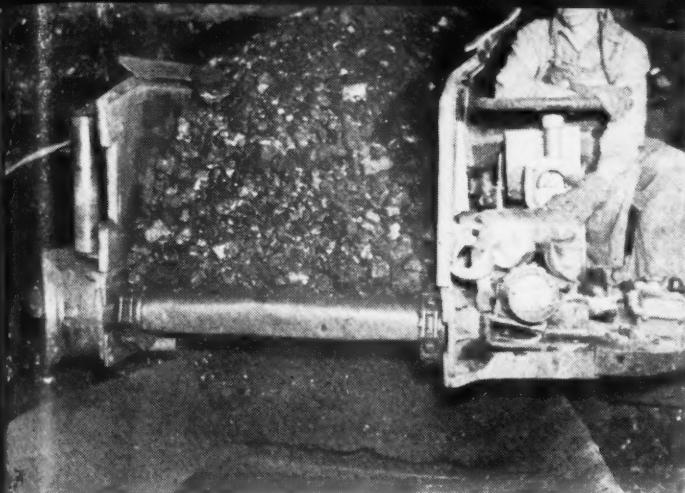
two-wire system then all the current would have returned through the track. In the three-wire system and with the high diversity factor that accompanies mechanical-loading operations not over one-third of the current passes through the track. *Diversity factor* is defined as the ratio of the sum of the maximum power demands of the parts of a power system to the maximum demand for the whole system.

Harry S. Gay, vice president and general manager of the Gay Mining Co. and also the Gay Coal & Coke Co., which pioneered complete mine mechanization in the Logan field of West Virginia, used the three-wire distribution system at another operation about eight years ago.

#### Requirements for System

The following conditions are prerequisites for the advantageous use of a three-wire d.c. system in mines: (1) two generating units in the same substation; (2) moving the substation close to the load center is considered impracticable; (3) two widely separated load centers fed from a junction point several thousand feet from the substation; (4) a high load factor, as is the case of mechanical mining.

Data on the mining equipment, production and efficiency at this operation was presented in *Coal Age* (April, 1947, p. 100) in the article on a self-propelled timbering machine in service at the Gay Mining Co.



Left—Shuttle car dumping at an elevator. When the 20-car trip has been loaded, the shuttle-car operator does a brief stint as a locomotive brakeman while he and the car trimmer take the loaded trip to the side track and bring back empties. Right—In this development work, coal is loaded before the stone is shot down.

## MULTIPLE HEADINGS And Planning Boost Development Coal

**Eight- and Ten-Men Crews at Rail & River Average 19 to 23 Tons per Man, Load 14 In. of Drawslate with Shuttle Cars — Loading-Head Moves Lose Only 1½-2 Hours Production Time — 20-Car Track Cuts Loading Delays**

By JACK H. EDWARDS  
Associate Editor, Coal Age

THAT DEVELOPMENT coal need not be high-cost coal nor handling drawslate on development the problem it once was, is being amply demonstrated in shuttle-car development at No. 3 mine, Rail & River Coal Co., near Bellaire, Ohio, where eight- and ten-men development crews are loading 19 to 23 tons of coal per man-shift. The Pittsburgh No. 8 seam,  $6\frac{1}{2}$  ft. thick, is mined and the development plan calls for loading the drawslate separately. As a result of careful planning and preparatory work done in advance, only 1½ to 2 hours of production time is lost when elevators and auxiliary items at the loading points are moved 240 ft. ahead.

No. 3 mine, adjoining the Ohio River in Belmont County, was opened 43 years ago and now produces 4,400 tons of coal per day. The rooms are mined on two shifts and development work proceeds on



Laying track in the gap at this crossing of the former shuttle-car road is part of the job done in the 1½ to 2 hours that production stops while the elevator is being advanced to a new position.

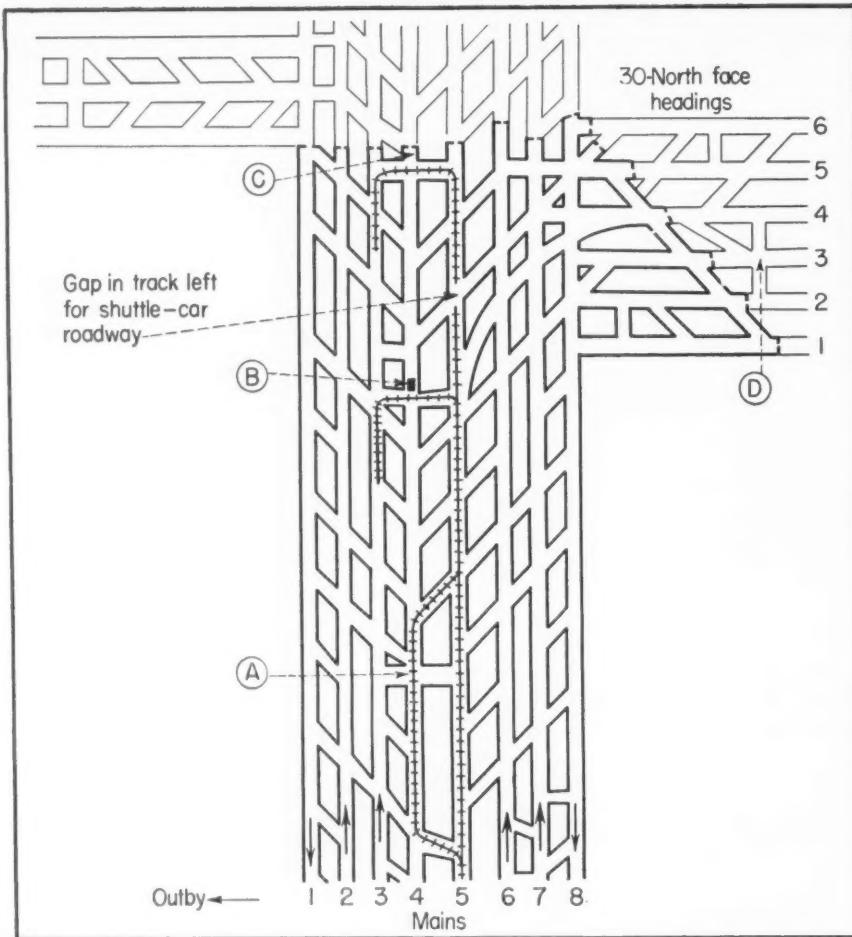


Fig. 1—Status in driving mains and turning a set of face headings at the stage when the shuttle-car elevator is to be moved from position "B" to "C". The preceding elevator position is indicated by "A". From position "C", the face headings will be developed a sufficient distance so that an elevator can be installed at "D" and be served by a loop haulage track like that used on the mains.

three. Modernization of the mine in 1940 by adoption of section belts and self-loading shakers, and the use of steel jacks and half-width plank headers to hold the draw slate in rooms, was a milestone in Eastern Ohio. That same system of self-loading conveyors and section belts still is in use in room work. Unfavorable roof conditions prevents pulling pillars.

#### "Stone" Averages 14 In.

There are two firm slate partings in the coal seam, totaling about  $3\frac{1}{2}$  in., one near the center and the other close to the top. The draw slate, locally termed "stone," averages 14 in. in the territory now being developed but its range is 1 to 60 in. Above that is 12 to 24 in. of roof coal (average, 16 in.), which, when 14 in. or more thick, affords fair support for a 6- to 10-ft stratum of very weak shale. A thick strong limestone above that has ruled out pillar work. A seam that is fairly level and the presence of

little water are favorable factors in the shuttle-car work. Cover ranges from 150 to 500 ft.

For some years after the room work was put on a systematic efficient basis, development continued to be a real problem. It was difficult to maintain enough development and the coal production from this source was inefficient. Continued effort by management to improve the layout, coordinate phases of the face cycle, improve supervision and better the working conditions has brought development work up to an efficient method of getting coal and somewhat relieved the pressure for more speed in that work.

#### Rooms on Faces

In No. 3 mine, the mains are driven on the butts of the coal. Turned off from them are the face entries driven on the faces. Off these are turned the butt entries, on which are installed the section belts, thus bringing the rooms on the faces of the coal.

The four development units in operation each have a Joy 14BU loader and one or two cable-reel shuttle cars. One unit, served by one shuttle car, is driving mains. The second, served by two cars, is driving face entries and also butt entries for the belt and duckbill production sections. Two other units, each with one shuttle car, are driving face entries and belt and duckbill entries.

#### Bugdusters Being Installed

Undercutting for the units that are served by one shuttle car is done with Goodman 512 shortwalls carried on Joy crawler trucks. Drilling is with post drills. The No. 512 shortwalls, also used in room work, are being equipped with bugdusters and three have been so fitted to date. For the unit served by two shuttle cars, undercutting and shearing at the center or at one side is done with a rubber-tired Sullivan IORU with 10-ft bar. Drilling for this development unit is done with a Jeffrey A5 mounted on a Joy crawler truck originally designed for carrying cutters. This unit, serviced by two shuttle cars and utilizing a shearing cut that affords better loadability, produces 23 tons per man-shift, as compared to the average of 19 tons for all four units.

At present, development is slightly handicapped since there is no spare, or substitute, cutting machine. Another Joy crawler truck is on order and when it arrives, a Type 512 cutting machine will be available as a substitute for the shortwalls.

The crews of each development unit number a total of 26 face men for the three shifts. On the afternoon and night shift, the eight-men crews include: one Joy operator; one Joy helper, who scales roof, shovels out corners, breaks up and prepares stone for loading and substitutes for the shuttle-car operator when he assists in the operation of a locomotive during a car change; two qualified cutting-machine operators; one driller; one shotfirer; one shuttle-car operator; and one loading-head man, who also loads dummies with rock dust. On the day shift each crew has two more men, one a clean-up man who rock dusts, and the other a "postman" who timbers air courses and breakthroughs.

The operating cycle is as follows: the Joy loads out the coal in No. 1 entry, then moves to No. 2 and loads the coal while top stone in No. 1 is being shot and the roof scaled.

Stone is drilled at the same time as the coal. From No. 2, the Joy returns to No. 1 and loads the stone. From there, the machine moves to No. 3 to load the coal, continuing that procedure across the six- or eight-entry system. Cutters and drillers, of course, work just ahead of the loader. All places are driven 12 ft. wide, and the stone is taken down in all headings, chutes and breakthroughs.

Contributing greatly to the efficiency of this development work is the use of a dead-end trolley and a remote-controlled locomotive for car changing. The shuttle cars discharge onto an elevator loading into mine cars averaging 2.07 tons each. All of these old cars will be replaced with solid-body 5-ton cars by October, 1947. The 6-ton locomotive, pulling a trip of 20 cars, is inched forward along a dead-end track by the loading-head man who energizes the trolley wire through a pushbutton-controlled magnetic switch.

#### Shifting Delay Eliminated

When the last car of a trip has been loaded, the loading-head man becomes the motorman and the shuttle-car operator his helper, or brakeman, in taking the loaded trip 200 to 800 ft. to the side track and bringing back the 20 empties left there by a service locomotive. There is no delay as would often happen if the service locomotive were scheduled to be waiting at the loading point ready to make a change of trips. As previously mentioned, the loading-machine helper may substitute for the shuttle-car operator during these intervals to have a shuttle-car full of coal waiting at the loading point and thus keep things moving.

Since extending tracks ahead of the loading point to accommodate a sizable string of empty cars would not be feasible with the efficient shuttle-car development plan now in use, a car-spotting hoist is ruled out for this job. At belt heads in production sections, however, spotting hoists are used because there is ample space for the empty track. In two of these sections new Brown-Fayro barney-type trip movers were installed last year. In addition to a traction hoist, each trip mover (see p. 120 of this issue) includes a short section of prefabricated track on which the barney with a car-catching dog operates.

The elevator moves in the development work are 240 ft. ahead and as previously mentioned, the delay

in production during a move is only 1½ to 2 hours. In preparing for a move, and while production continues, all wiring is done and track laid, except for a gap across the shuttle-car road. Top is prepared for the elevator and holes are drilled in the bottom ready to shoot out a shallow depression for it.

The first step of the actual move

is to have a Joy pull the elevator to within 6 ft. outby of the bottom hole to be shot. After the shot, the loading machine loads the bottom rock into a shuttle car.

While the elevator is being set and braced, electrical connections and laying of a section of 30-lb. rail across the gap left for the shuttle-car roadway are completed. Outby

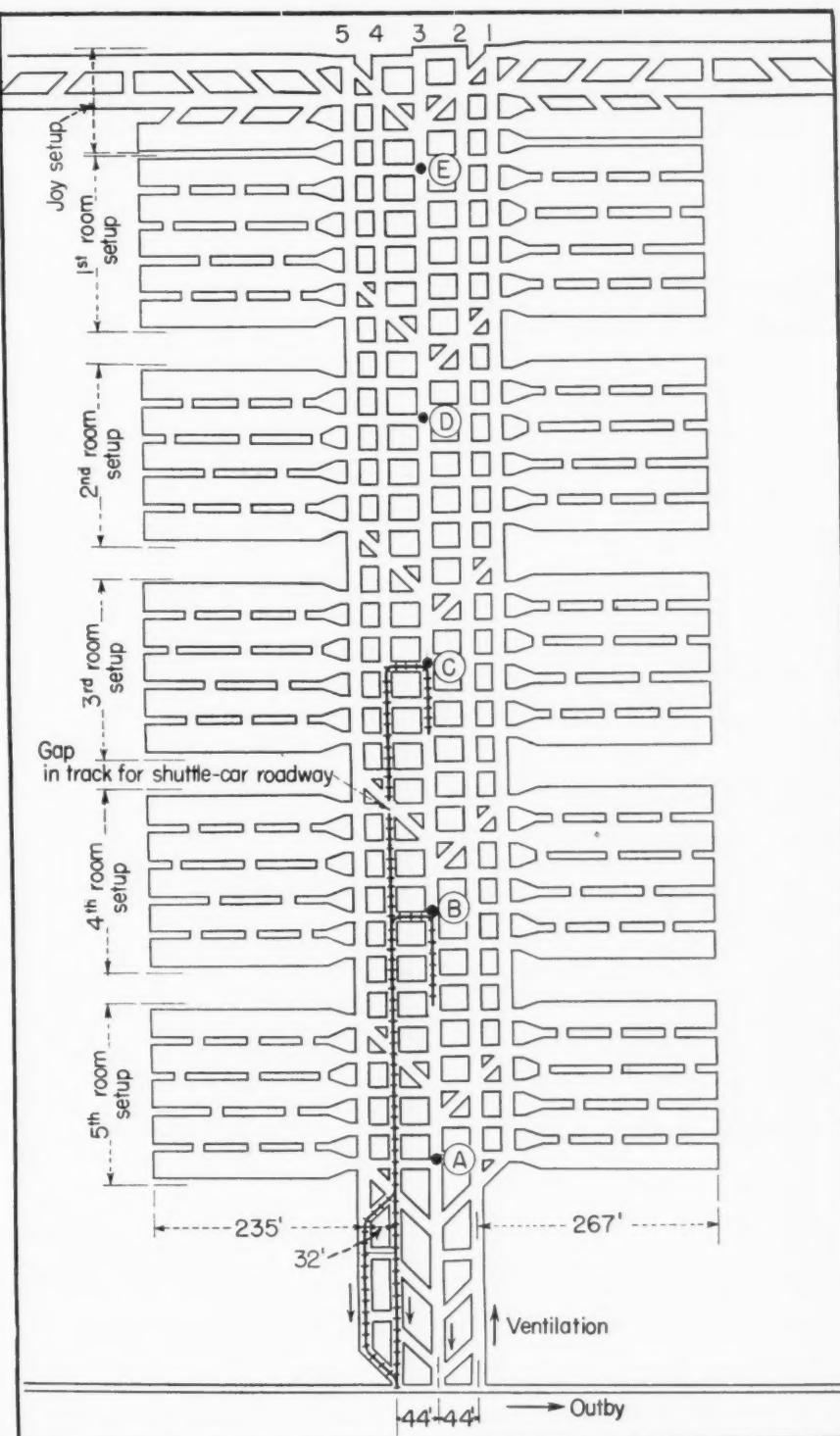


Fig. 2—Letters in circles indicate successive loading-head positions for the shuttle-car elevator in driving a set of butt headings for panel mining with a belt and self-loading conveyors. Tracks are indicated at the stage when the elevator is to be moved from "B" to "C". The belt will be installed on No. 3, and the track left in No. 4 to serve as a supply track as the groups of rooms are worked back.



Shrubbery and white waterproof paint on the concrete-block walls enhance the appearance of this new bath house at the service center. The change-room has germicidal lamps on its walls.



New central shop in the background and next to it at the right, the supply house. Portal of the men-and-material slope of this new service center is at the left foreground.

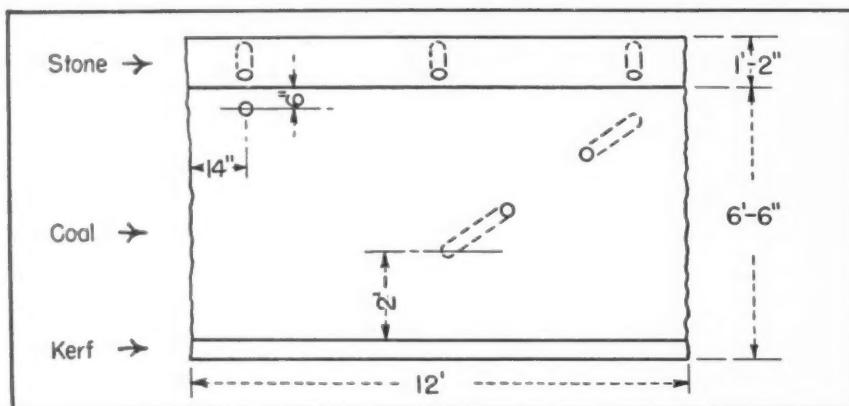


Fig. 3—Standard drilling plan for shooting coal and top stone in a 12-ft. heading.

the temporary loop track, 60-lb. rail is used.

The haulageway and the passing track are kept on the return air during development, thus eliminating doors and permitting the carrying of line brattice close to the face. Inby ends of butt entries for the 1,500-ft. belt panels are cut through by bleeders to the adjoining completed panel and then the whole set of entries becomes intakes.

#### Eight Mains Driven

Mains are driven in multiples of eight, and face headings in multiples of six. Heavy solid lines in Fig. 1 indicate the status of development work when the shuttle-car elevator is ready to be moved from position "B" to "C". Working from "B" with the standard 475-ft. reel cable, the shuttle car has turned the 30 North face heading and developed those places far enough so that from position "C" this group of face headings can be developed the extra distance needed to make way for an elevator installation at "D", where it can be served by a

loop track. Normally, the shuttle-car hauls are limited to 375 ft.

In Fig. 1, arrows indicate the ventilation currents. Headings No. 4 and 5 are kept neutral to eliminate doors and curtains from the track haulage and provide smoke-free escapeways in case of fire. Trip movements provide ventilation on these neutrals.

Top rock for the seven overcasts required when a set of face headings is turned off is shot down and loaded out during development, but the overcasts are not installed until later. While the mine is classed as gaseous, the main return carries only about 0.1 percent of methane.

Shooting is done with duPont Lump Coal C permissible explosive. To bring down the coal, three holes are drilled and each is loaded with three sticks. The rib-hole charges, which are 12 to 14 in. from the ribs, are bedded 6 in. below the stone. The usual snubber is placed at the center and 2 ft. from the bottom. By angle drilling both snubber and right rib holes are drilled from one set-up of the drill. Top stone is shot with three holes an-

gleed up to bed the explosive near the top. Fractions of sticks are used and the total amount for the three holes ranges from one-half to two sticks.

Foremen turn in report forms for each crew on each shift, showing total men on the crew, total cars of coal and stone loaded from each place, the time, duration and cause of delays, condition of each place and location of the loading machine and cutter at the end of the shift.

Inherent characteristics of the coal are such that a positive means of dust control is a necessity. Water sprays are used on all cutter bars, loading machines and elevators. Loaded cars are sprayed near the sections by overhead nozzles, some having controls operated automatically and others, manually. Ribs and roof are rock-dusted, fine coal is cleaned off the bottom and the bottom is sprinkled to assure best-possible dust control.

#### Water Supplied From Outside

The spray and sprinkling systems are closely integrated with underground fire protection. The water supply comes from creeks through boreholes and from the Ohio River through a 3-in. pipe extending 5 miles along the main haulageway with taps and valves every 500 ft. In two of the mining sections there are underground reservoirs holding 20,000 gal. each. A centrifugal pump is located near each reservoir, to substitute from this stored water should the supply coming from the 3-in. pipeline fail, and to provide additional pressure in case of a fire. Outside storage consists of one high tank near the portal at the river, and another at



The slope is 360 ft. long and the cover here is 100 ft. Miners walk in and out, using steps in a compartment on a split of air separate from the tracked compartment that serves as a return airway.

the top of a borehole above a working section.

In development work, the 3-in. pipe is extended after each move-up of the shuttle-car elevator. It is reduced to  $\frac{1}{2}$  in. at the end for connection to a  $\frac{1}{2}$ -in. garden hose.

In 1944, a new service center and man portal for the mine was completed at a new slope close to the working sections and  $4\frac{1}{2}$  miles by highway from the tipple and main portal where the men formerly entered. This slope, 320 ft. long and penetrating 100 ft. of cover, serves as a return airway. The manway, with concrete steps, is partitioned and is on a separate split.

Buildings at this new portal include a bath house, mine office, central shop, supply house and substation. The bath house, shop, and supply house are of conservative concrete-block construction but all were designed for full utility.

#### Paint Improves Appearance

A coat of white waterproof paint imparts a pleasing appearance to the bath house and decorative shrubbery planted along one side and one end adds to the effect. Modern equipment in the bath house includes germicidal lamps in the change room. The shop is fitted with an electric bridge crane and has all of the machine tools and auxiliary equipment needed to handle heavy and intricate repair jobs for the company's two mines.

The supply house, instead of being fitted with bins which are hard to keep clean and do not afford a ready view of the contents, has shelves on which rest steel trays that can be pulled out or removed. Each tray is marked with the catalogue number of the item that corresponds to the perpetual inventory



"Keep the White Light Burning" says this safety board at the slope portal. The timber cars are loaded with locust, used exclusively for main-line timbering. Most of that put in 30 years ago is still good.

LOADING MACHINE REPORT							Rail and River Coal Company	
Mine	#3		Crew	C2				
Shift	3rd		Section	29N5W				
Lead Mach. No.	Zeller		Cutt. Mach. No.	Gully		Date	2-5-47	
Operator			Operator	Hora		Locomotive No.		
Room or Entry	Cars Coal Loaded	Cars Stone Loaded	Time in Place	Time Moving	MINUTES DELAY		REASON FOR DELAY	
1	9	2					1	Loader Repairs
2	14	8					2	Cutter "
3	14	8					3	Drill "
4	20	4					4	Motor "
5	21	2					5	Cable "
	78	24					6	Power Failure
							7	No Cars
							8	Loader off Track
							9	Cars off Track
							10	Mo. off Track
							11	Bad Roof
							12	Landing Falls
							13	Tight Coal
							14	No Powder
							15	No Bits
							16	Blocked by Motor
							X	Moving Equipment
								Lack of Supplies
							OCCUPATION	HRS.
							1 Operator	
							1 Operator Helper	
							2 Cutters	
							2 Drillers & Shooters	
							1 Motormen	
							1 Trip Riders	
							Trackmen	
							Postmen	
							Cleanup Man	
							Preparermen	
							8 TOTAL	
Condition of section:-								
#1 cut and shot #2 face and breakthrough #3 breakthrough cut-machine here #4 fall - bad top #5 Joy here and one shuttle of coal								
REMARKS: Condition of equipment shall be noted on back of carbon copy.								
							Okey Ryan Foreman	

Fig. 4—The 78 cars of coal and 24 cars of stone shown on this daily report are typical for a loading machine serviced by a shuttle car in development work.

cards posted daily by the supply house clerk.

John T. Sydnor, president of the Rail & River Coal Co., resides in Wheeling, W. Va. and has his offices in the First National Bank Bldg., in Bellaire. E. F. Maurer, general superintendent, Andy F.

Whitt, chief engineer, and J. E. Williams, personnel and safety director, also have their offices there.

At No. 3 mine, H. H. Kirby is superintendent. Michael Yonko is general mine foreman; Michael Duda, master mechanic; and Sidney Holcomb, chief electrician.



## TWO-PASS METHOD Extends Shovel's Range at Buckeye

**Stripper with 45-Ft. Boom Handles up to 45 Ft. of Cover, First on 12-Ft. Bench Made by Bulldozer, Then on Coal —Tipple Prepares Coal for Both Rail and Truck Loading —Raw-Coal Bin Accommodates Up to Seven Trucks at Once — Two-Stage Crushing Increases Stoker Quality**

By RALPH R. RICHART  
Associate Editor, Coal Age

BULLDOZING a 12-ft.-high shelf after blasting the highwalls permits a 2½-yd. shovel with a 45-ft. boom to work 45 ft. of cover at The Buckeye Furnace Mining Co., near Wellston, Jackson and Vinton Counties, Ohio. A 450-ton raw-coal storage bin, accommodating as many as seven dump-trucks unloading at once, insures a supply of coal for starting the tipple on rainy morn-

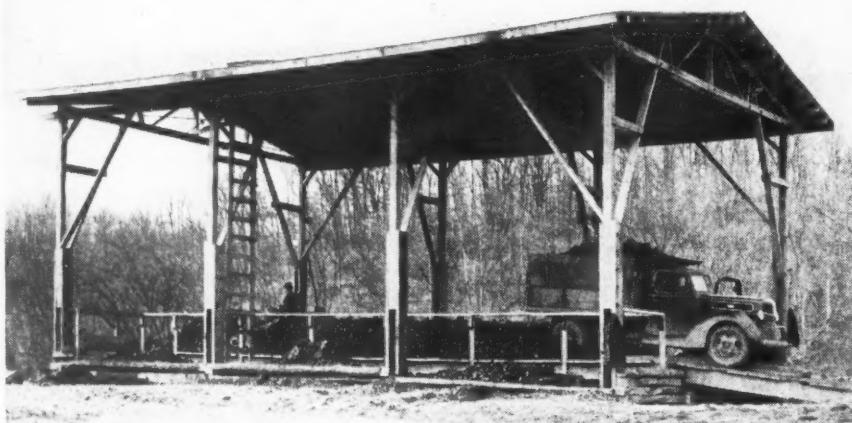
ings when the strip-pit roads are slippery. The screening plant was designed to prepare carbon (minus  $\frac{1}{4}$  in.) and stoker ( $\frac{1}{4} \times 1\frac{1}{8}$  in.) coal for railroad loading and 6-in. lump for truck trade. The Buckeye Furnace Mining Co. was organized in 1946 by the Morrows, formerly of the Morrow Mfg. Co., now owned by the McNally Pittsburg Mfg. Corp., Pittsburg, Kan.

Working from an improvised bench the 1201 2½-yd. Lima (diesel) shovel with only a 45-ft. boom works up to 45 ft. of overburden at this hilltop stripping operation. Overburden for the No. 7 seam (3 to 6 ft. thick), averages 25 to 30 ft. Using the bench method to increase the dumping range of the short-boom shovel necessitates making two passes to dispose of the overburden for the ordinary cut.

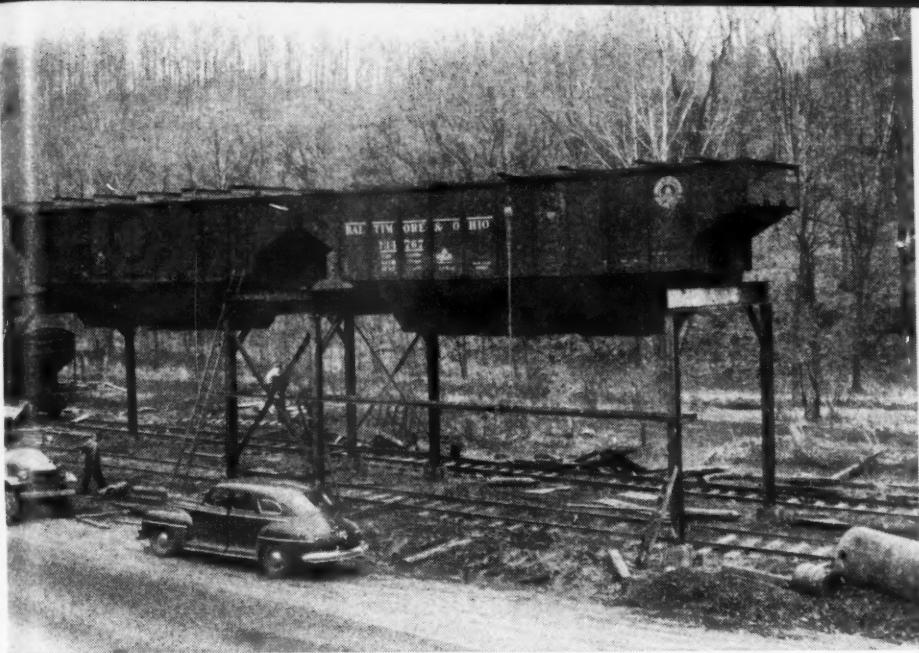
### Six-Step Stripping Cycle

The stripping cycle is as follows: (1) highwall is drilled from the coal bench prior to the loading of the coal in the exposed cut; (2) coal is loaded into 7½-ton trucks with the 1½-yd. Type 604 Koehring shovel; (3) the highwall is shot, one hole at a time; (4) the bulldozer (F.D.E. Cletrac tractor with Heil blade) levels part of the blasted highwall into the cut where the coal has been removed. This provides a 10- to 12-ft. bench, above the fireclay, on which the stripping shovel works; (5) the 2½-yd. stripper with the 45-ft. boom makes one pass throwing the spoil as far as possible; and (6) on the second pass, the stripping shovel, working on the coal, dumps on the near side of the last row of spoil.

For preparing the overburden a Hardsocg 5-in. drill is used to drill holes on 20-ft. centers and to a depth of 40 ft. The holes are loaded with Hercules explosive, usually 150 to 200 lb. per hole. A 500-g.p.m. pump with two 3-in. discharge lines, formerly used as Civilian Defense fire-fighting equipment, keeps the pit dry.



The 450-ton raw coal storage bin where as many as seven trucks may dump at once.



A 450-ton raw-coal storage bin (at extreme left) and facilities for both rail and truck loading are features of the preparation plant for this Ohio stripping.

In setting up the preparational facilities, the Morrows felt that the place to provide coal storage for the tipple was at the raw-coal bin. This, they believe, was the most economical place to provide overall storage capacity and is what they recommended to their clients when they were building preparation plants. So when the Morrows started the Buckeye Furnace Mining Co.'s. operation they provided a 450-ton bin for raw-coal storage. The bin has two compartments, one for regular coal and the other for stained and outcrop coal.

#### Storage Bin in Hillside

A place was excavated in the side of the hill for the raw-coal storage bin. Both the Nos. 4 and 5 seams, some 20 ft. apart, were exposed in the pit made for the bin. The bin is constructed of wood and lined with sheet iron. A roof has been erected over the bins and later siding is to be added, leaving room for the trucks to back under and dump. The top of the bin is even with the ground which eliminates any backing-up-while-loaded operation for the trucks. As many as seven end-dump trucks may dump their loads at the raw-coal bin at one time, three on each side and one from the end using the runway over the top of the bin. This runway is long enough to accommodate a long drop-bottom-type truck in the event that drop-bottom units are used in the future.

The coal is discharged from either compartment through gate-controlled openings onto an apron conveyor feeder that discharges on an apron-type picking table. The shaking

screen takes out the minus 1-in. and bypasses it directly to a drag conveyor leading to that section of the tipple over the railroad. The 1x6-in. coal goes to a 24x36-in. single-roll primary crusher set for a top size of 2-in. The plus 6-in. coal can either be loaded into trucks for domestic trade or crushed to stoker size and loaded in cars. Coal from the primary crusher drops directly into a 24x36-in. double-roll crusher set for a top size of  $\frac{7}{8}$ -in. Both

crushers are McNally-Pittsburg and are rated at 100 tons per hour. This arrangement of two crushers in series, according to the Morrows, does a better job than a single crusher and gives a more uniform product and favors the production of a higher percentage of the top size,  $\frac{1}{4} \times 1\frac{1}{8}$ -in. stoker coal.

Reporting on two-stage crushing practice in the industry, which closely parallels the ideas held by the Morrows, *Coal Heat* (the stoker magazine), in March 1947, had the following: "By cooperation between coal operators, crusher manufacturers and plant designers, the modern two-stage crushing circuit has been worked out as the most efficient method known to date. It means extra equipment for the preparation plant, but it yields a high return of accurately crushed and sized coal . . . It might seem that a reduction in handling by crushing only once and screening only once would be just as effective and less costly. Practice shows that this is not actually true. With a friable material such as coal, reducing from very large sizes to small sizes in one pass through a

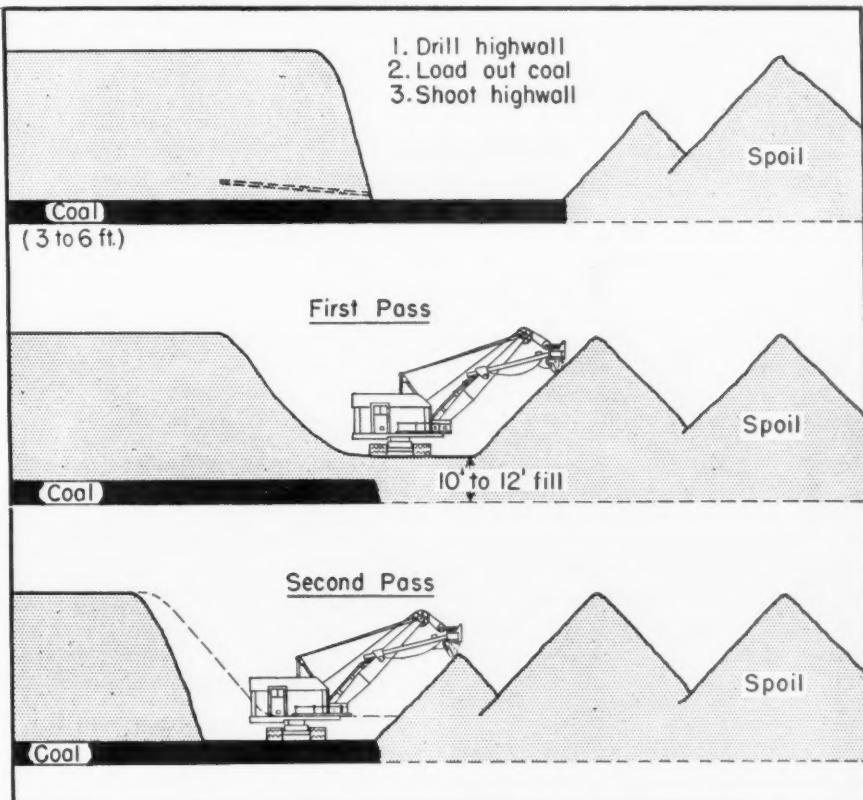


Fig. 1—How 45 ft. of overburden is removed in a two-pass operation by the stripping shovel having only a 45-ft. boom.

crusher produces a high percentage of fines. Furthermore, this unfavorable condition increases in volume when the tonnages grow heavy. The two-stage circuit system, with two passes through the different crushers, while more expensive as an installation, is more economical as an operating unit because it makes more merchantable coal, with more accuracy."

Continuing with the flow of coal through the Buckeye plant, the secondary crusher empties its product into the drag conveyor, already carrying the minus 1-in., where it is carried to the tipple over the railroad. Here the coal passes over a 5 x 14-ft. double-deck Nordberg-Simons vibrating screen which separates the minus  $\frac{1}{4}$ -in. carbon

and the  $\frac{1}{4} \times 1\frac{1}{8}$ -in. stoker. Any plus  $1\frac{1}{8}$ -in. going over the end of the top deck passes through a small double-roll crusher before reaching the stoker bin. Lack of screen area is responsible for a good share of the bottlenecks in preparation plants, but no such trouble is in evidence here. Only about one-third of the 70-sq. ft. top deck of this classifying screen is needed to make the first separation, the plus  $1\frac{1}{8}$ -in. This observation was made by the writer on a rainy day when the coal coming from the pit was quite wet.

#### Old R.R. Cars Used for Bins

At present, the stoker bin holds only 25 tons and the carbon runs

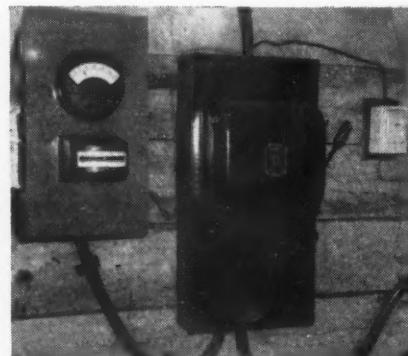
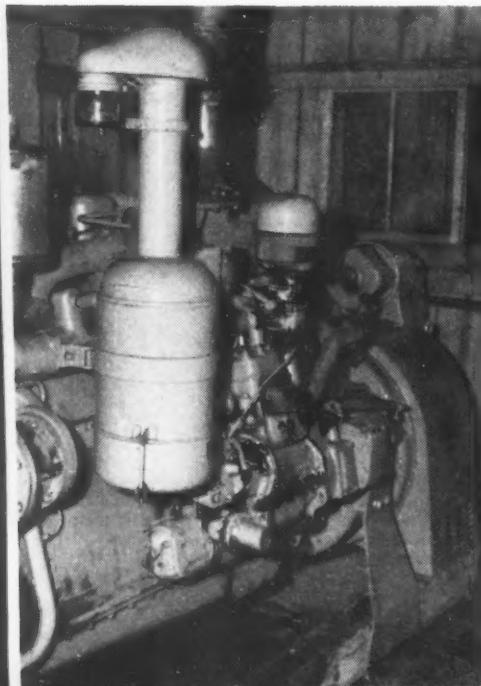
directly to a car standing on the run-a-round track. As shown in an accompanying illustration, two condemned coal cars are being converted into storage bins for carbon and/or stoker coal. These were purchased from the Baltimore & Ohio R.R. and at the time of delivery were lifted into place by the wrecking crane. Using the crane solved the problem of handling for the mine and also permitted the railroad to immediately salvage the trucks belonging to the cars. The new prepared-coal storage bins will permit the stoker and carbon cars to be loaded on the same track, leaving the run-a-round track open. The erection of the additional storage bins brings the total storage capacity for the mine, for both raw



The end-dump trucks use the runway over the bin as well as the side pockets for dumping space. Truck haulage to the tipple is by contract.

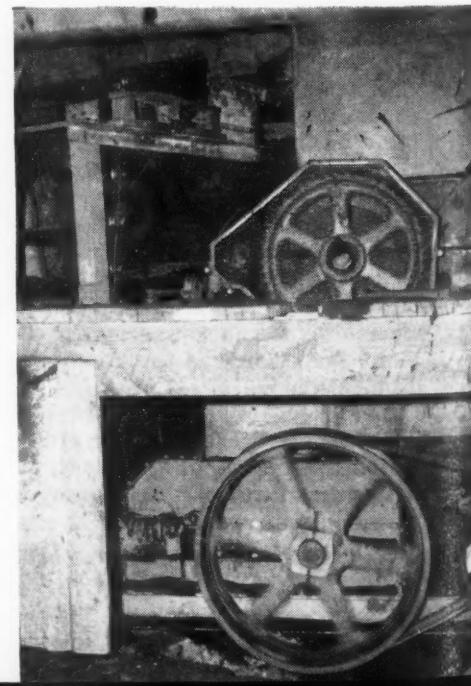


Considerable storage is afforded by the runway itself and the coal can be cleared off once the bins are partially emptied.



The diesel-electric plant (left) and meters which supply the 440-volt 3-phase a.c. power for the various tipple motors.

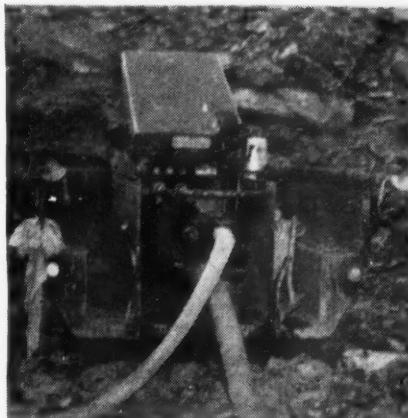
Right—the 100-ton-an-hour, two-stage crushing circuit consists of a 24x36-in. single-roll primary unit and a 24x36-in. double-roll secondary unit.





The loading shovel seldom waits on trucks since they operate on a contract basis.

Lump coal is available for loading trucks at the same time that stoker and carbon are being processed for railroad loading.



This 500-g.p.m. pump with two 3-in. discharge lines, formerly used as Civilian Defense fire-fighting unit, keeps the pit dry.

and prepared coal, to 700 tons. It is interesting to note from the construction angle, that all the steel-work for the tipple was cut and fabricated on location and all the steel connections were arc-welded.

#### **Oil Spraying Added**

A Viking Model ESPU-100 oil heater and spray unit, with a 10,000-gal. storage tank, is being installed for treating the stoker coal and for spraying the tops of the loaded carbon cars.

By changing a gate at the end of the shaking screen, the plus 6-in. lump can be diverted from the crusher circuit to an apron conveyor for truck loading. Coal is trucked as far west as Indiana and north as far as Michigan. The largest load taken by a single truck is 18 tons. The truck business even in April, when it would be expected to be dull, was, on the contrary, quite brisk. After the line of trucks that form in the morning have been loaded, it is no trouble to serve the more spotty truck trade in the afternoon. The tipple man, who handles the controls, simply changes the gate and the truck-loading boom begins receiving coal immediately.



Frank C. Morrow (left), after following the manufacturing business for 35 years, finds field work quite relaxing. Ford R. Morrow (center) is vice president and general manager, and Walter Buescher supervises the stripping operations.

This operation is ten miles from Wellston, where the only source of highline power is a single-phase 4,000-volt rural electrification (R.E.A.) line that, of course, is not suitable where 3-phase power is essential. To supply the tipple motors with 3-phase 440-volt a.c. power, Buckeye has installed a stationary diesel-electric set consisting of a Caterpillar D-13000 diesel engine and a Type ALT 3-phase 440-volt 93.8-kva. 0.8-power-factor self-regulating Louis Allis a.c. generator. Allen-Bradley 440-volt magnetic starters with air circuit breakers are provided for the tipple motors.

#### **Trucks Use 35-Ton Scale**

Also in use in the tipple area are two condemned boxcars secured from the B. & O. when the coal cars were purchased. One serves as a storeroom and the other as a field office and scale house. A 35-ton 40-ft. scale is used to weigh the coal trucked from the mine.

Another interesting stripping angle, and one that is akin to the preparation plant facilities just described, is that Buckeye buys coal from other strippers in this region.

The reason is three-fold: (1) it eliminates competition; (2) it removes the need of investing in coal preparation facilities for any would-be competition; and (3) it makes available more prepared coal from this area for both shipping and domestic trade. Present tipple production including coal purchased from other strippers is about 600 tons per day.

#### **Pit Haulage by Contract**

Hauling from the Buckeye pit to the tipple, approximately 2 miles one way at present, is by contract. This arrangement, according to the Morrows, is quite satisfactory since the mine doesn't need to worry about truck maintenance and the number of haulage units are varied to meet actual loading conditions at the pit. All trucks are weighed on a 25-ton 24-ft.-long scale prior to being dumped at the raw-coal bin.

The Buckeye Furnace Mining Co. is a closely held corporation. The owners are Frank C. Morrow, Ford R. Morrow, Walter Buescher and Max W. Morrow. The New York Coal Sales Co. handles all rail shipments from this operation.

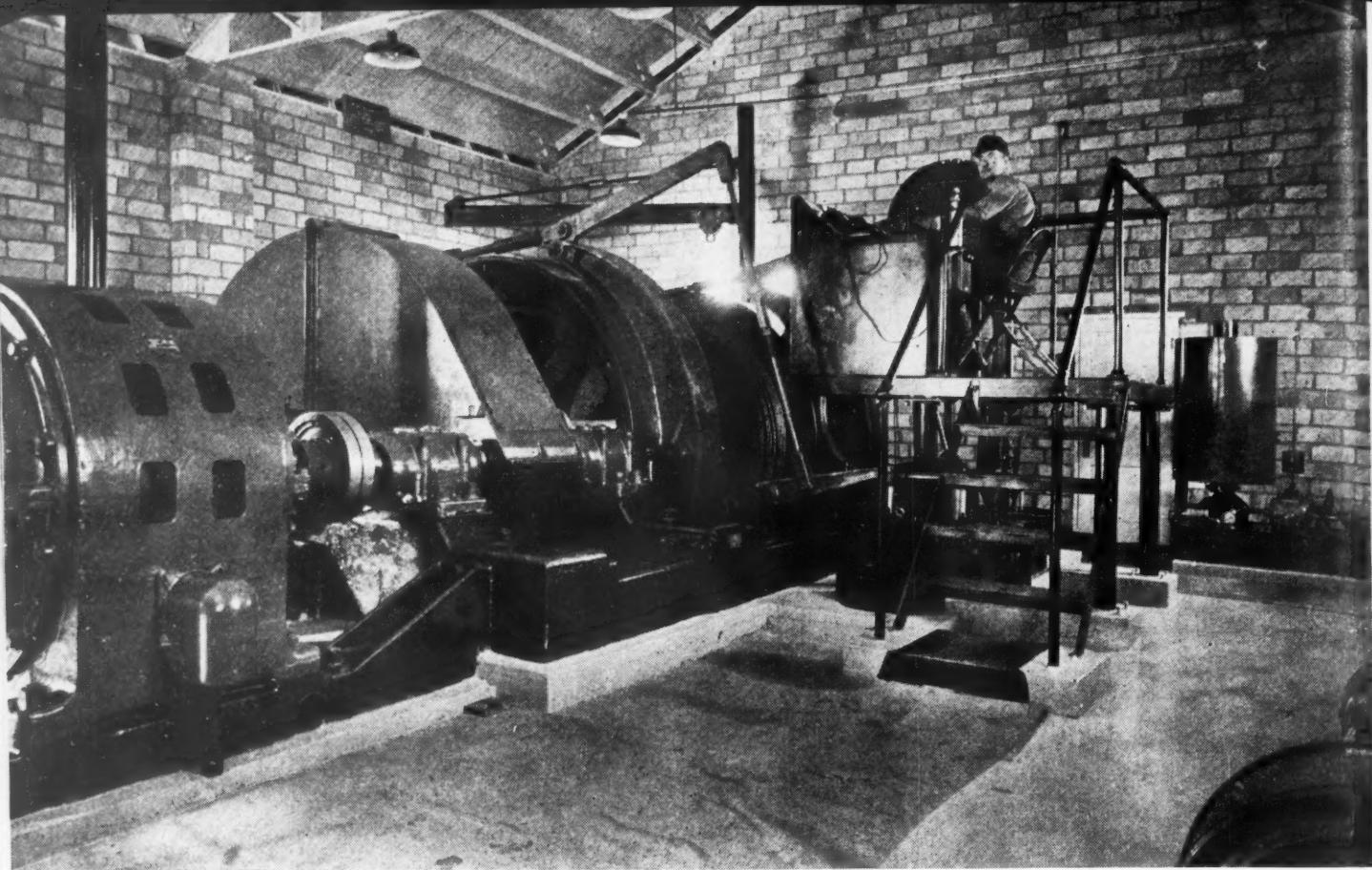


Fig. 1—How the 450-hp. motor (only one visible) is coupled to this slope hoist located on the surface. The control desk is on the operator's platform and the oil accumulator for the hydraulic brakes is against the wall. An m.g. set for dynamic-braking is barely visible at the lower right-hand corner of this illustration.

## DYNAMIC BRAKING Promotes Efficiency in Slope Hoisting

**Electric Braking System Operating at Several Western  
Mines for Lowering Trips Without Using Conventional  
Hydraulic Braking — Handles Man-Trips Safely — Cuts  
Brake-Wheel and Block Wear**

By JOSEPH A. SETTER  
Industrial Engineer, General Electric Co., Denver, Colo.

A NUMBER of alternating-current slope hoists driven by 300-hp. to 1,100-hp. motors and incorporating a unique system of direct-current dynamic-braking have been installed in several of the most modern coal mines in Colorado and Wyoming. This electric braking

system is used for stopping and landing car trips from full speed lowering of about 1,500 f.p.m.; also for dropping loaded trips into a parting at slow speeds; lowering loaded trips at speeds less than full speeds; and for lowering man-trips and materials at accurate and uni-

form safe slow speeds of 5 m.p.h. All of this is possible without using the conventional friction braking system except to hold the load at its destination, and results in lengthening the life of brake wheels and blocks to many times normal.

To better understand the operation of the hoists, a brief description of the layout of one of the mines is offered. The mine contains six coal seams, as shown in Fig. 4, with an interval of from 70 to 170 ft. between seams. The seams are 5 to 17 ft. thick. They pitch approximately 14 deg. and are intersected by a horizontal rock tunnel from the portal to the third seam from the top. Only these three seams are being worked at present. All coal is hauled through the rock tunnel by 15-ton trolley locomotives to the tipple, which is near



Fig. 2—Tie hoist houses serve the second and third seams as indicated in Fig. 4. Sheaves on towers support the hoist cables between the hoists and the slope portals.



Fig. 3—How the U-shaped control desk is arranged for the hoistman's convenience. The operating levers (left to right) control the normal-a.c. operation, hydraulic braking and d.c. dynamic-braking.

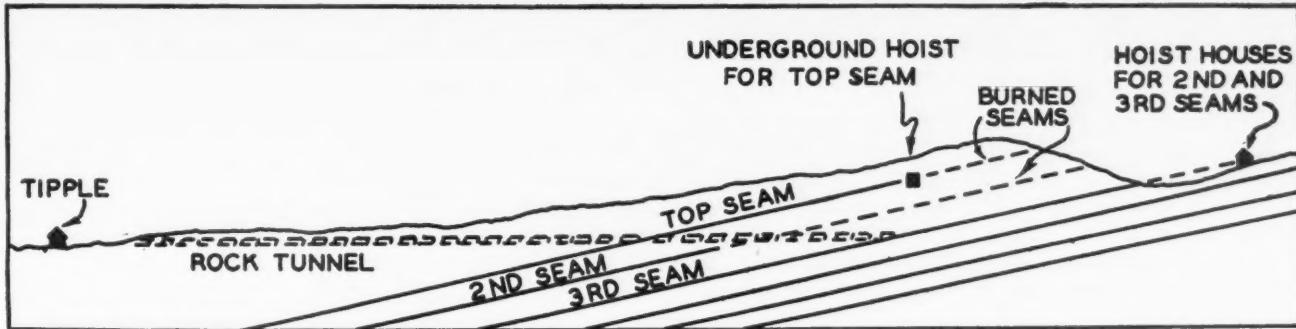


Fig. 4—D.c. dynamic-braking applied to a.c. slope hoists proves worth in handling trips between 14-deg. seams and rock tunnel at this operation in the Rocky Mountain region.

the portal. An individual hoist in each seam pulls the cars above the tunnel and drops the loaded trips into partings, from which points the locomotives take them out in trips of about 30 to 40 cars. This operation is novel in itself because slope hoists usually pull the coal trips out the top of each seam and drop to the tipple from there.

At this mine, the first hoist installed was above ground where the third seam outcropped. The second hoist was installed underground in the upper seam about 450 ft. below the outcrop but above the rock tunnel. The third hoist is beside the first but serves the second seam through a rock tunnel because of a burned-out area of coal near the outcrop.

It will be noted from Fig. 4 that both the first and third seams extend above the rock tunnel approximately 1,200 ft. Coal from the several entries in these upper seams has the unusual experience of being lowered to the haulage tunnel, whereas in most mines it usually must be hoisted. Dynamic braking is particularly useful here to drop the coal at slow speeds because the

distance is so short (1,200 ft. or less) that normal a.c. lowering with manual braking is not feasible.

Horizontal entries in the seams are turned off at approximately 300-ft. intervals and 8-ton cable-reel gathering locomotives are used to bring the loaded cars to the slope hoists.

Mindful of past experience at other properties, where hoist application was a somewhat haphazard affair, coal-company officials determined that the job would be done right in this new mine, thus avoiding the troubles and bottlenecks growing out of the past custom of first installing small hoists, which often had insufficient capacity or incorrect control for the job, and then replacing with larger hoists.

The hoists shown in Fig. 1 are of steel construction and are cylindrical-drum units, ungrooved, with a diameter of 6 ft. and a face-length of 7 ft. The diameter of the graphitic-iron brake drums is 96 in. and the hoists are fitted with two sets of oil-operated post brakes and overwind, overspeed and other protection. The drums are section-

alized in six parts, are split longitudinally for ease in handling and erecting, and are made with cast-steel ends and rolled-steel shells. The capacity of the drum is 7,200 ft. of 1 3/8-in. rope, in five layers, and the rated full-load rope speed is 1,500 f.p.m. The rated rope pull with two 450-hp. motors is 25,000 lb., on which basis the rated trip size up a 21-percent grade with each car weighing 4,500 lb. and carrying 8,000 lb., is six cars, although eight cars being handled at the present time.

The drum shaft is turned by a large herringbone gear driven by single-reduction dual herringbone pinions connected to the two motors by flexible couplings. It also is possible to operate with a reduced trip size and one motor should it be necessary as a result of breakdown, inspection, or maintenance of the other motor. With two motors, it is expected that the hoists can handle over 300 and perhaps as many as 400 cars per shift at the maximum hoisting distance.

Signals are transmitted from the trip riders to the hoistmen with conventional bell-ringing relays

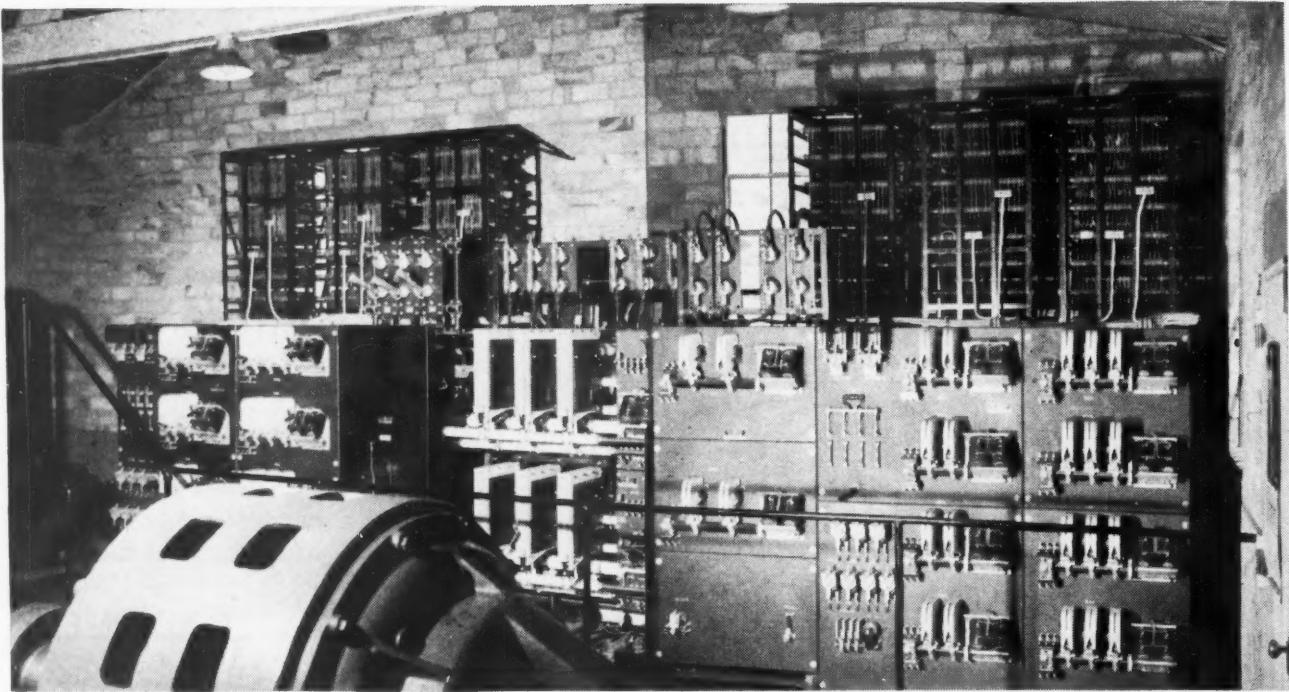


Fig. 5—Magnetic control panels and "skyscraper" resistors used in controlling the two 450-hp. hoist motors. To the right of the incoming line breaker (above motor) are the 3-pole primary-reversing contactors. Next, are the 2-pole dynamic-braking contactors. On the ends, are the secondary-control panels serving the individual motors.

with 24-volt transformers connected to the bell lines. Experiments are being conducted with a sensitive electronic tube-operated relay which eliminates all voltage from the bell lines. The two bell lines are connected to terminal posts on the electronic relay, which in turn connect the cathode of the tube to the grid whenever the bell lines are shorted by the trip rider. An infinitesimal current flows and absolutely no spark is produced—an ideal safety arrangement in a gaseous mine. Furthermore, in the absence of any voltage, all shock hazard to the trip rider is eliminated and the bell can be operated from any distance up to five miles or more if necessary.

The hoists are powered by two 450-hp., 720-r.p.m., 2,300-volt, 60-cycle, 40-deg. C. wound-rotor induction motors of heavy-duty mine-hoist construction, including special banding on the rotor to permit 50 percent overspeed. Two of the hoists above ground with their associated motors and control equipment are housed in tile hoist rooms with concrete floors, as shown in Fig. 2. The third hoist is located underground in the top coal seam in a specially prepared room with cement roof, walls and floor.

The incoming line 2,300-volt primary power for both motors is furnished by a manually operated 600-amp. three-pole oil circuit breaker with a 50,000-kva. interrupting capacity equipped with overload and

undervoltage relays. A new-type high-voltage air-break quiet-operating primary reversing contactor of skyscraper construction and equipped with potential-interlocking relays (center, Fig. 5) supplies power to both motors through two sets of three-pole disconnecting switches. These switches permit the primary power to either motor to be disconnected in case of trouble or when it is desired to operate with one motor at light loads.

#### Motor Control Set-up

Each motor has an individual secondary-circuit magnetic control panel with definite-time-accelerating relays, eight accelerating contactors, undervoltage relays, fused control switch and selector switch; also a multi-tier skyscraper-construction cast-grid secondary resistor. This resistor is arranged so that any resistor section can be easily replaced in case of trouble. The selector switch is a cam-operated 44-circuit switch which, when operated, can completely isolate every wire on the panel from the control-power supply in case of emergency and permit operation at reduced load with the other motor. In case of trouble with any contactor, therefore, operation can be resumed immediately and the difficulty repaired without cessation of operation and with complete safety to the maintenance man.

During preliminary development

work in the mine when full power was not required, this selector switch permitted operation of the hoist with one motor, with resultant savings in power. The secondary panels are at the extreme ends, as shown in Fig. 5, with the resistors mounted behind in two high vertical stacks.

All the a.c. magnetic contactors have special armatures with 250-volt-d.c. operating coils supplied by a 5-kw. motor-generator set. This insures more positive and quieter operation than conventional a.c. contactor coils.

Equipment to make dynamic-braking possible includes a dynamic-braking panel shown to the right of the primary panel (Fig. 5). It contains two 150-amp. two-pole contactors with wide-spaced contacts insulated for 2,300 volts for applying the direct current for braking each motor. A d.c. series overload relay also is included, as well as a d.c. undervoltage relay, as a safety feature to prevent operation of the hoist unless d.c. voltage is available for braking when desired. Two sets of two-pole switches are located above the panel to isolate the circuit to each motor from the d.c. generator in case of trouble or for servicing.

The motor generator set for furnishing the braking current consists of a 12.5-kw. 50-volt 1,800-r.p.m. shunt-wound generator coupled to a 20-hp. 220-volt induction motor. The pushbutton for

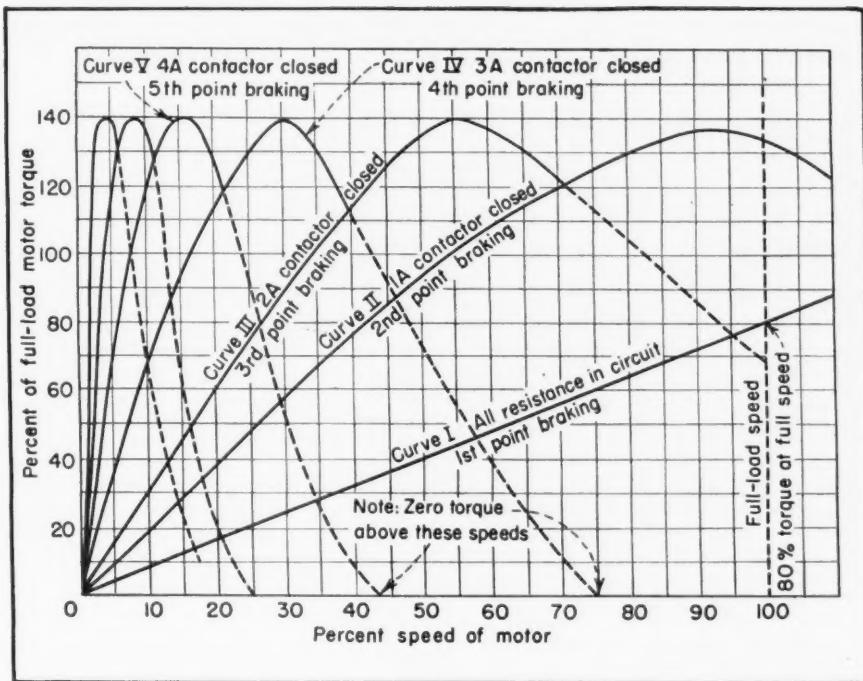


Fig. 6—Family of speed-torque curves for one of the 450-hp. hoist motors during dynamic braking.

starting the motor, and a rheostat for varying the d.c. voltage, are located on the control desk. To produce 100 percent braking torque in each motor, only 40 volts d.c. is required to provide 125 amp. of full-load current in one phase of the stator winding. It may seem strange that only 40 volts d.c. are required on a 2,300-volt a.c. motor to obtain full-load motor current. It should be remembered, however, that there is no reactance with d.c. and the resistance of one phase of the winding is only about 0.33 ohms, consequently 40 volts is sufficient. The power from the generator through the contactors to the motor is controlled with a special master switch which will be described later.

#### How Dynamic Braking Works

At this point it might be in order to detail the operation of the dynamic-braking system. When direct current is applied to one phase of the stator of the 450-hp. wound-rotor motor, it sets up a 10-pole d.c. magnetic field. If the rotor is then turned by an external prime mover, the motor temporarily becomes an a.c. generator and can be loaded up by dissipating the energy produced in the secondary grid resistor. The prime mover in this case is the overhauling trip of coal cars dropping down the slope, which turns the drum and thence the motor through the gears. It should be noted here that the rope friction and efficiency of the hoist act to reduce the work required by

the generator in stopping the trip by dynamic braking.

If the generator is loaded up electrically by dissipating more energy in the resistor than can be supplied by the loaded trip, the generator must slow down. Conversely, if the loaded trip produces more energy than can be dissipated by the resistor, it speeds up and can run away. This then provides a flexible method controlling the speed. If a high secondary resistance is connected across the generator, a small current flows and the energy dissipation is low. Consequently the trip runs at maximum braking speed. If various degrees of resistance are cut out, the current rises and the energy dissipation increases to the point where the constant overhauling load slows down to a creeping or practically stalled speed, at which time the mechanical brakes can be applied to hold the load.

It so happens that the conventional grid resistor, designed to give smooth accelerating torques to the motor when hoisting, also gives suitable retarding torques produced by the current in the generator when braking. Most mine hoist resistors are designed to give about 35 percent motoring torque on the first hoisting point to take up the slack in gears and the rope. This same resistance in the circuit when braking from a lowering speed of 100 percent provides a maximum braking torque of about 80 percent. Successive resistance accelerating points provide from 75 to 200 per-

cent motor torques and about 140 to 150 percent maximum braking torques.

The comparison of braking conditions possible is shown by the curves in Fig. 6, showing percent speed plotted against percent full-load motor torque. With 125 percent of normal-rated full-load current flowing in only one phase of the stator winding from the d.c. generator, a maximum retarding torque of 140 percent of full-load motor torque is available no matter how little resistance is left in the secondary circuit. The various curves represent the torques available as the several accelerating contactors operate. Thus, Curve I represents the first braking point with all resistance in the secondary circuit. Similarly Curve II is the second braking point with Secondary Contactor 1A short circuiting a part of the resistance, etc.

It should be noted that for various small amounts of secondary resistance left in the circuit as the secondary contactors close, that the maximum braking torque of 140 percent occurs at a particular low speed and drops off rapidly to zero at a speed much lower than 100 percent full. This is not the case on the first two curves where a positive torque is always available for braking from high lowering speeds of 100 to 125 percent. The braking control system must then be laid out so that the operator cannot cut out too much resistance at the higher speeds or a runaway might result if a heavy load is being retarded. It has been found from experience that perfectly safe and positive braking is always assured if the operator cannot cut out more than four secondary contactors (giving a total of five braking points) and the control system has so been designed.

#### Handling Light Trips

There are cases where the 140 percent retarding torque is too great for lowering light man or material trips at 5 m.p.h., consequently the control also is designed to reduce the d.c. voltage and current. This merely drops the maximum braking torque for the entire family of curves to a lower value, so that the trip can speed up because the torque of the overhauling load now exceeds that of the generator. The maximum braking speed possible occurs with all the resistance in the circuit. Thus, for example, if it is desired to run at 50 percent speed with only 30 percent load

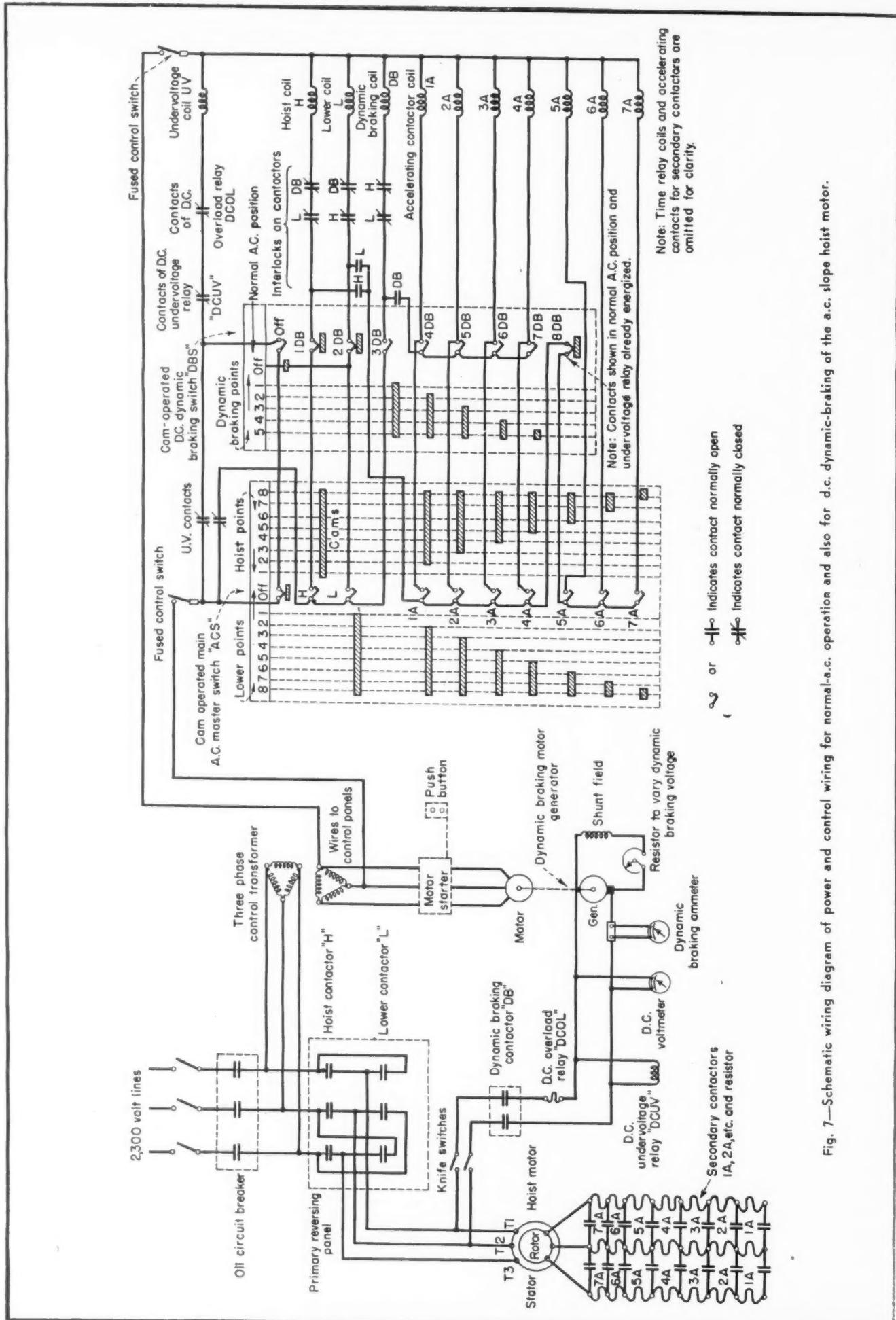


Fig. 7.—Schematic wiring diagram of power and control wiring for normal-a.c. operation and also for d.c. dynamic-braking of the a.c. slope hoist motor.

torque available (referred to the generator shaft), the current in the stator winding must be reduced so that Curve I drops down to this value at 50 percent speed.

Another interesting part of this installation is the master control, or "nerve center," for the entire hoist which is housed in the steel console control desk mounted on the hoist platform, Figs. 1 and 3. This control desk is somewhat of an innovation because it provides a "metal-clad" conveniently arranged completely protected mounting for all the switching equipment. In contrast, most mine hoists have control equipment inconveniently located all over the operator's platform with unsightly wiring. In the console, all master switches, push-buttons, etc., are conveniently grouped and completely wired to outgoing numbered terminal boards prior to being installed on the hoist platform. This greatly minimized the work of connecting the complicated nerve center to the primary and secondary control panel terminal boards when the hoist was placed in service.

#### Control Arrangement

The console is "U-shaped" to permit the operator to stand in the middle with his operating handles on either side. The main operating a.c. nine-position hoist and lower master switch is on the left side under the top cover with only the handle projecting through a slot. The d.c. dynamic-braking master switch is on the right side and similarly mounted. The operating handles for both switches are extra long for ease of use.

In the center of the console are two levers controlling the valves for the hydraulic brakes and providing graduated braking in accordance with the position of the levers. Pushbuttons for starting the motor-generator sets and accumulator motors are on the sloping back panel. Two pistol-grip selector switches give backout protection and control of braking voltage. The instruments include separate a.c. ammeters to show load on each motor, an electric rope-speed indicator (operated from a tachometer generator on the motor shaft), d.c. voltmeters for the two m.g. sets and an ammeter to show d.c. braking current.

Panel lights below the meters show which contactors are energized and enable the hoistman to determine on which reduced-speed point he is running and check correct operation of primary and

braking contactors at a glance.

Fig. 7 is a simplified schematic wiring diagram of the hoist control. Many of the refinements necessary are omitted for clarity. It will be noted that neglecting the dynamic-braking control, operation of the hoist with a.c. hoisting and lowering is of the conventional type using time-accelerating relays. This was deemed advisable to avoid confusing hoistmen by asking them to operate differently, with the possibility of a serious wreck during a period of excitement.

Power connections from the 2,300-volt line through the oil breaker and primary reversing contactors to the hoist motor are shown schematically on the left in Fig. 7. The secondary accelerating contactors and resistor are of the usual type. Step-down control transformers produce 220 or 440 volts for the control panels and the motor-generator set, which uses a conventional pushbutton starter. The output from the generator is connected through a d.c. ammeter and a d.c. overload relay, "DCOL," to a two-pole magnetic dynamic-braking contactor, "DB." The connections to one phase of the stator winding, T1-T2, are completed through a two-pole high-voltage knife switch. Other refinements in the generator circuit include a d.c. undervoltage relay, "DCUV," to make certain that d.c. power of correct voltage is available before the hoist can be operated; also a d.c. voltmeter and a variable resistor to change the d.c. voltage when it is desired to change the speed-torque characteristics for braking.

#### Control-Circuit Connections

The schematic connections for the control circuits are shown on the right side of Fig. 7, including the main a.c. master switch, "ACS," the dynamic-braking master switch, "DBS," and the various contactor operating coils. Practically all connections from the "ACS" switch for normal a.c. operation of the hoist must pass through the contacts of the "DBS" switch to the operating coils as shown. The "ACS" switch has an "off-position" reset point and eight points hoist and lower, although larger hoists use up to 10 individually controlled points. The "DBS" switch has an "off-position" point, a "normal-a.c. position" and five braking points. The a.c. undervoltage relay coil "UV" is connected in series with the off-position contacts of the two master switches. This assures having both switches

in this position for starting the first time or after an undervoltage or overload condition occurs. Electrical interlocks, "H," "L," and "DB," on the hoist, lower and dynamic-braking contactors prevent, for example, operating "H" when either "L" or "DB" contactors are energized; or operating on dynamic braking when the high-voltage contactors, "H" and "L," are energized.

#### A.C. Hoist Operation

In operating the hoist on a.c., all knife switches and the circuit breakers are closed, which provides control voltage. Then the brakemotor generator set is started and voltage is adjusted to the proper value of 40 to 50 volts, which picks up the "DCUV" relay and closes its contacts in series with the "UV" relay. With both master switches in the off position, the "UV" relay is energized and seals itself in so the "DBS" switch handle can be moved to the "normal a.c." position as shown in Fig. 7. This closes "DBS" cam-operated contacts 1, 2, and 8 and sets up the circuit for a.c. operation from the "ACS" switch. The load can then be hoisted or lowered in the conventional way. The definite-time-accelerating relays with their associated contacts in series with the respective secondary accelerating contactors are omitted from Fig. 7 for clarity but normally are required to keep the accelerating torque peaks on the motor within bounds.

If it is desired to stop the load with dynamic braking when it is being lowered at full speed with the "ACS" switch on the last point and the "7-A" Contactor short circuiting all the resistor, the operation is simple. The operator leaves the "ACS" switch as it was and pulls toward him the "DBS" switch handle to the first braking point, like an ordinary manual brake lever. This drops out Lower-Contactor Coil "L" when "DBS" contact 2 opens, and in turn drops out all secondary contactors when interlock "L" opens the circuit to the 1-A, 2-A, etc., contacts of "ACS." At the same time contact 3 on "DBS" closes to energize the Dynamic-Braking Contactor Coil "DB" and d.c. is applied to one phase of the stator winding, as previously explained, at the value previously determined by the hoistman for adequate braking.

In operation, it is found that it takes a second or two for the current to rise in the motor winding from zero to the maximum, say,

125 percent. This is fortunate because it applies the retarding torque to the motor gradually up to the value of about 80 percent, shown on Curve I, Fig. 6, so that absolutely no shock to the rope or the gearing is apparent. The hoistman immediately notices a distinctive rise in pitch in the sound of the motor as it grabs hold, which gives him confidence that it is operating properly. A braking torque of 80 percent usually is insufficient for rapid deceleration, so the DBS switch is moved to the second position, where a section of resistance is cut out by Contactor 1-A. This gives a braking torque of about 130 percent at full speed.

Here, it will be noticed, a new power feed is brought down through the "DB" interlock to "DBS" contact 4 to the Secondary-Contactor Coil 1-A. This circuit is independent of the position of the main master switch, "ACS," which eliminates any special thinking on the part of the hoist operator in manipulating two or more devices simultaneously and which might cause a wreck. Subsequent braking points 3, 4, and 5 energize Contactors 2-A, 3-A, and 4-A to remove additional resistance and keep the braking torque at a maximum near 140 percent as the trip slows down.

#### Avoiding Runaways

At any time during the braking operation, the hoistman can return the "ACS" switch to the "off" position at his convenience. Here, also, contact 8 on "DBS" has opened the circuit to the last three contactors, 5-A, 6-A and 7-A, to prevent short circuiting too much resistance and thus avoiding the possible runaway condition explained previously. Usually the trip comes nearly to rest in several revolutions of the drum, depending upon the manipulation of the switches, and the hoistman, with a little experience, can land the trip accurately. Then the mechanical brakes are applied to hold the load. Since the energy in stopping a full-speed trip is now absorbed by the resistor, it can be seen that the life of the mechanical braking system should be increased many times.

Sometimes, while the trip is lowering at full speed on a.c. regenerative braking, a steep pitch is encountered for a short distance which might cause overspeeding of the motor. In such a case, the operator could leave the a.c. master switch in the full "on" position and temporarily apply one point of braking with the d.c. braking

switch to check the speed. Then, by returning the d.c. switch to the "normal-a.c." position, and without touching the a.c. switch, the hoist would automatically accelerate to full speed as the several time relays operate.

A similar operation is possible when spotting a trip at a lower entry. Suppose the operator should check a trip too quickly on d.c. braking so that the cars would not normally reach the lower entry. He could, by throwing the d.c. switch to the "normal-a.c." position, quickly apply a.c. lowering power to the motor to feed out sufficient rope to let the trip coast down again to the final destination before applying d.c. braking again. After a few hours instruction, an ordinary operator learns to manipulate the a.c. and d.c. master switches from one to the other and spot trips with hair-line accuracy.

#### Operating Over Flat Spots

One mine in which this control system is used has a rather long flat spot on the seam over which the cars roll slower than the hoist drum unwinds the rope on regular full-speed a.c. lowering. The d.c. master switch has been designed to take care of this condition, also, by providing an "off" position where neither a.c. nor d.c. power is applied to the motor. This permits the trip to coast over the flat spot at whatever speed it can pull the rope from the free hoist drum. As the trip again accelerates to full speed on the next steep part of the slope, a.c. power is automatically re-applied by simply throwing the d.c. switch to the "normal-a.c." position.

In the mine first referred to, a loaded trip of coal cars is hoisted above the intersection of the rock tunnel with the coal seam, then dropped down a parting into the rock tunnel, from where it is hauled to the tipple. Dynamic braking is particularly useful here because the heavily loaded trip of cars must be dropped slowly. This operation is performed by manipulating only the d.c. braking switch. By bringing the DBS switch from the "normal-a.c." position to the "off" position, the a.c. power is removed to permit the trip to coast to rest on the hoisting cycle. As it starts down the parting by gravity, the operator puts the switch on the first braking point, which usually provides the proper lowering speed with safety and without touching any manual brakes until the trip is brought to rest. Another mine has

an operating condition requiring the lowering of loaded coal trips for long distances at speeds below full speed and d.c. braking is especially useful. Other mines using this system bring the loaded cars out the portal and then drop to the tipple directly at slow speed, using dynamic braking.

Perhaps the most important feature which in itself justifies the cost of a d.c. dynamic braking system is in the lowering of man and material trips. Most slope hoists, to get the tonnage desired, must have a normal rope speed of from three to four times the allowable man-trip speed of 5 m.p.h. or 440 f.p.m. No induction motor can be operated at less than 100 percent lowering speed on a.c. with all the secondary resistance short circuited. Consequently, a man-trip ordinarily must be lowered slowly by gravity without power and with the post brakes applied continually. On steep pitches and long slopes of from 5,000 to 7,000 ft. or more, the brake lining gets nearly hot enough to burn and the drums become scorched and sticky. The linings wear out quickly and maintenance becomes a serious problem in normal operation.

With the dynamic braking system the operator usually applies one or two points of braking and the man-trip lowers at a safe and uniform speed without jerking. The electric rope-speed indicator tells the operator at all times what the lowering speed is. If the pitch increases or decreases, he can apply more or less braking without much manual effort to keep the speed constant. This gives the men riding the trip more confidence in their safety.

#### Adaptable to Old Hoists

Although this article describes the d.c. dynamic braking system applied to a new hoist control equipment, it also can be added to existing magnetic control equipments on old hoists. About six dynamic brakes have been added to slope hoists in Colorado and Wyoming, varying in size from 300 to 1,100 hp. Equivalent operating results are obtained.

This dynamic braking system has been successfully operating for the past five years on various hoists and every hoist operator using it is enthusiastic in his praise of it. Physical effort and nervous fatigue in operating a hoist are reduced materially and mechanical brake maintenance should be a thing of the past.

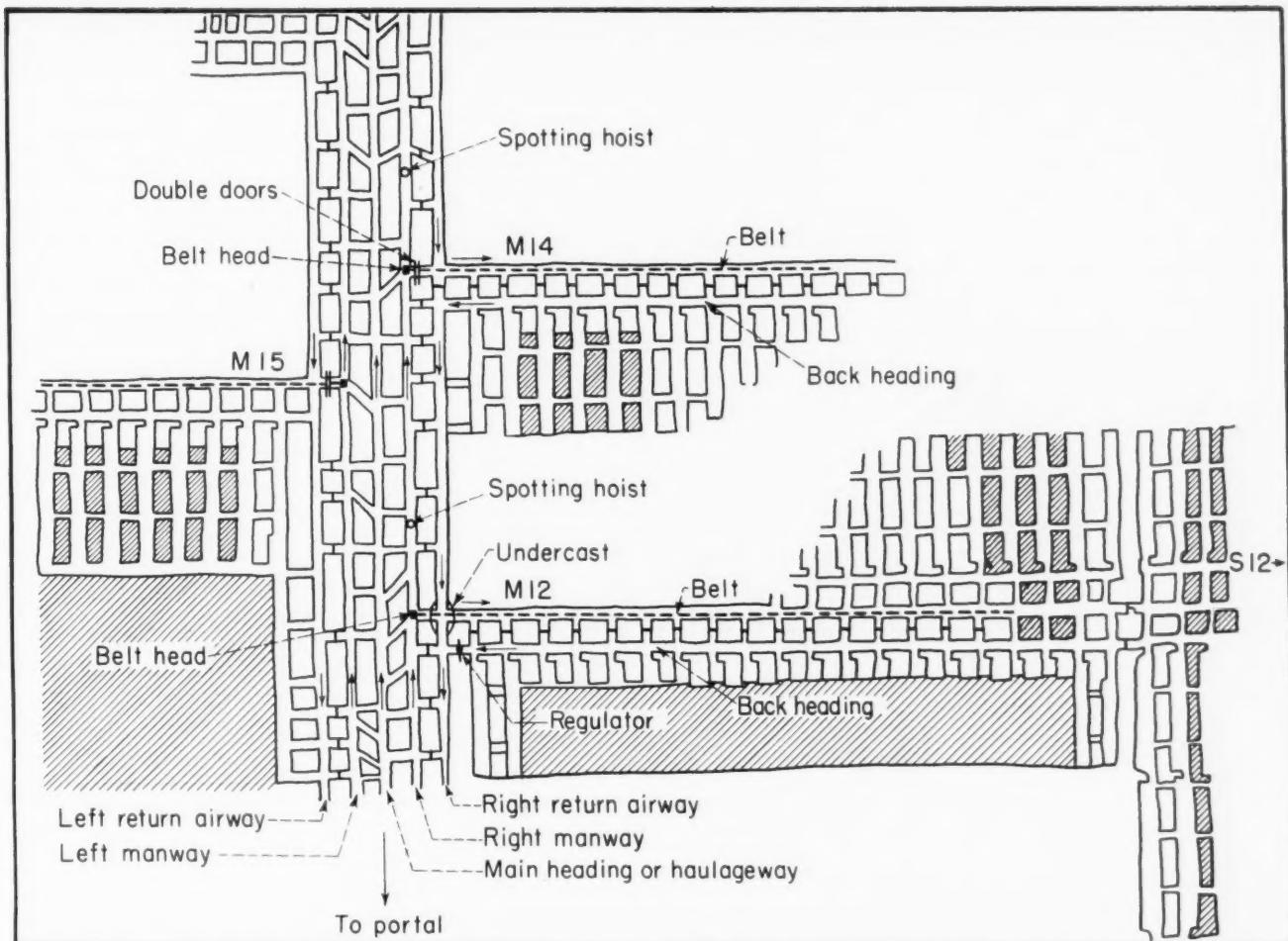


Fig. 1—Belt section M14 being the farthest inby on that side requires no undercast. One is used in M12, which is on a separate split. Ventilation for belt sections on the left follows the same plan shown for those on the right.

## SEPARATE SPLITS For Sections Help Double Air Supply

**Second Fan Relocated in New Air Shaft, Plus Separate Splits, Reduces One-Way Air Travel to Lower Water-Gage From 4.5 to 3.2 at Lancashire No. 15—Undercasts Used in Belt Sections Cost \$100 Against Overcasts**

**at \$350**



IMPROVED VENTILATION, far above the state requirements, coupled with thorough dust control and use of permissible and flame-proof

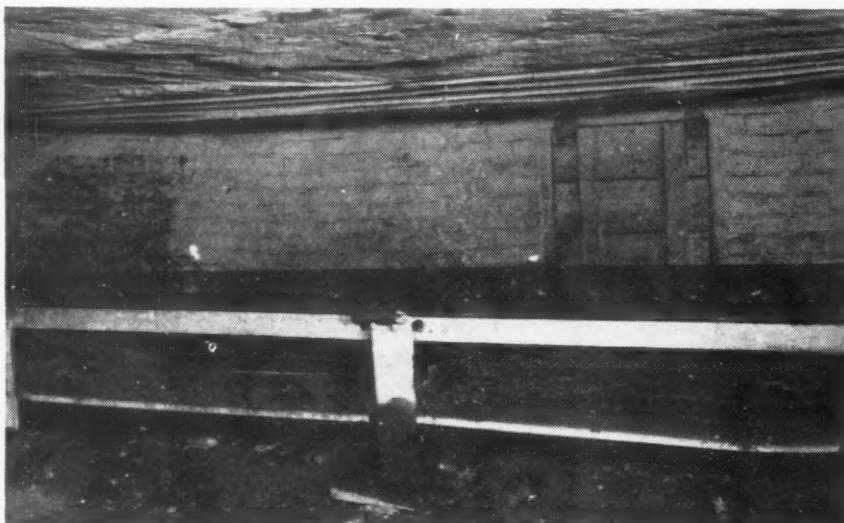
equipment in working sections, has been the long-range safety goal successfully achieved at the Lancashire No. 15 mine of the Barnes &

Tucker Co., Barnesboro, Cambria County, Pa. In this gaseous mine, coal loaded into cable-reel shuttle cars by mobile loading machines is discharged onto section belts which in turn discharge into mine cars on the main haulageway. In 1931, when the company pioneered by trying an entry belt, planning of ventilation improvements and other changes to insure safer operations was begun. Now, every section is on a separate split and no door is used on any haulage entry. Undercasts, used when air must cross a belt, have proved very successful and much cheaper than overcasts.

Richard Todhunter Sr., who has operated mines for the Barnes & Tucker interests for 40 years and is now president of the company,



This undercast conducts return air under the belt. The excavation is spanned with bricks and concrete that are supported by recoverable pre-cut 40-lb. rail spaced 8 in. apart.



Walls above the undercast are brick 4 in. thick. The belt conveyor rests on a concrete floor that serves as the roof of the undercast.

was its general manager for many years. His son, Richard Todhunter Jr., is now general manager. An unswerving policy of long-term planning, careful engineering and a prime regard for safety, by this family team, has paid off. The mine operates seven belt sections and produces 3,000 tons per day. The mine layout is highly standarized and great emphasis is laid on driving all places accurately on centers.

#### Top Bone Left in Rooms

Lancashire No. 15 mine is a drift operation mining the Lower Kit-tanning or "B" seam, which here consists of 40 in. of clean coal. Above the coal is 8 in. of bone and then 10 to 12 ft. of fairly firm slate. The bone is left in place in the rooms but is taken down on beltways, manways and tracked haul-

ageways. The Pennsylvania mine law requires a minimum height of 4 ft. along beltways. Room pillars are extracted as panels are worked.

Line brattice is extended to within 8 ft. of the face, or within 2 ft. of the 6-ft. cut. Emission of methane is fairly constant and is not subject to outbursts. When pillars or stumps are being pulled, a section must be dropped at times until the percentage of methane in the return from that split drops to less than 0.5. With the present ventilation supplying 255,000 c.f.m., the average methane in the main returns is approximately 0.3 percent.

As is shown in the accompanying drawing, a five-entry system is driven for the mains in advance of the belt entries and one additional entry is driven off the butt entry of the belt set-up, forming an additional return on each side of the

main and thus changing to a seven-entry system. The main heading and the adjoining manways are intakes and the right and left airways are returns. Belt entries, designated as MI2, MI4 and MI5 in the illustration, are on 640-ft. centers. Maximum length of a belt conveyor serving any section is 1,500 ft.

Ventilation of MI4 belt entry, which is the farthest inby on that set of mains, is on the same split as the heading development of those mains. Belt heading MI2, however, is on a split of its own, which is accomplished by use of an undercast conducting air of the right return airway under and across the belt heading. A regulator is installed in the back heading, or return, from that section.

#### 10,000 C.F.M. per Section

Eleven men comprise the normal working crew in a section and under the present ventilation system 10,000 c.f.m. is supplied each section, almost five times the 200 c.f.m. per man Pennsylvania law requires. As a panel is completed two pillars are left so that the worked-out area can bleed into the returns.

Cost of building an undercast to carry return air across the belt heading totals \$100 for labor and materials, as compared to \$350 for an overcast at the same location. The undercast is 12 ft. long, with the air passageway measuring 6 ft. wide and 5 ft. deep. The roof of the undercast, which serves as the floor of the belt heading at that point, is supported by 40-lb. pre-cut rail spaced 8 in. apart to accomodate one brick set lengthwise between each rail. Over this brick, 2 in. of concrete is placed to make the flooring for the heading. Two men lay the rail, place the brick and mix and apply the concrete in one shift.

#### Undercast Rails Recovered

The 12-ft.-long rails normally have a 3-ft. bearing on each end and recovered when a belt section is completed. The side walls of the beltway, 4 in. thick, are of common brick and two men can lay them in one shift. The undercast is excavated after the belt has been installed. The excavated material, a fairly hard slate, is loaded by hand onto the belt, from which it is discharged into mine cars for disposal outside.

In some places water level in the strata below the coal would cause an undercast to fill and block off the air. So where such a condition is

suspected, a test hole is made to determine the water level before the decision to construct an undercast is made. An overcast is built in preference to installation of a pump. Cost of constructing an overcast is uncertain, however, because if several feet of the roof is taken, the top may be so weakened that as much as 20 ft. may fall.

Life of a belt-heading undercast is usually one year. When a panel is completed and the belt and back headings are to be sealed, the rails first are recovered and the walls then taken down to allow free passage of air along the return airway.

#### Spare Belts Speed Set-Up

Two extra belt-drive units and two extra tail units for the Jeffrey belt conveyors are kept on hand and with these a belt is set up in the next section to be mined, ready for a production crew when a section is finished.

At the time the first belts were installed, the mine had doors on the main haulageways, was ventilated with an air supply of 125,000 c.f.m. in two splits. Air had to travel from the main portal to the farthest workings and back. As more belts were purchased and new mechanical sections developed, overcasts were built on the main haulageways.

In 1941, a 6-ft. La-Del fan, Trolly-designed, was installed at the main portal to augment the existing Jeffrey 3x6-ft. centrifugal fan and the total air was raised to 200,000 c.f.m. Consistent with the plan to provide enough air through the mine to give a wide margin of safety, excavation of an air shaft was begun 15,200 ft. from the main portal. Pending its completion, the water-gage on the La-Del fan operating at the main portal was 4 1/2 in. and this fan alone was consuming 135 hp.

#### New Shaft 528 Ft. Deep

The new shaft, 528 ft. deep to the bottom of the seam, was completed in April, 1946. It has a 35-ft. cement collar and below that is lined to the bottom with creosoted wood. Inside dimensions are 12 ft. 4 in. by 14 ft. 4 in. A stair compartment, 8x12 ft., is partitioned by a curtain wall of corrugated-type Robertson Protected Metal nailed to wooden buntons and with joints made practically air-tight by overlapping. The stairs are creosoted wood with a landing every 8 ft. 4 in.

The La-Del 6-ft. fan was moved to this airshaft. It and the older

Jeffrey fan still in use at the haulage portal are operated exhausting. The stair or escape compartment, on the fresh air, is regulated to 5,000 c.f.m. The La-Del fan, operating at 780 r.p.m., handles 140,000 c.f.m. at 3.2 water-gage. The old fan, working against the same pressure, now handles 115,000 c.f.m. The mine now has four intakes, three of which are drifts at

this issue) and are transported on Joy crawler trucks. Each machine is equipped with nozzles supplied from a hose connected to a piping system distributing mine water. Rock dust is freely used to dilute what coal dust gets into suspension and settles out on floor, ribs and roof.

A third defense against ignition of gas is safe electrical equipment.



Shuttle cars discharge directly onto belts at Lancashire No. 15 mine.

the main portal and one a 62-ft. shaft nearby.

No attendant is kept at the outlying shaft where the La-Del fan operates. It is powered by a 150-hp. 440-volt induction motor equipped with automatic starter and with operating signals wired to the mine shop near the portal about 3 miles away. The signal mechanism at the fan consists of a small 200:1 speed reducer belted from the fan shaft and driving a make-and-break contactor. Lamps that blink continuously while the fan is running and horns that blow if it stops, are mounted inside the shop and also on the outside where they can be seen and heard from the mine office. There are similar signals on the Jeffrey fan, which is but a few hundred feet from the shop.

#### Water Provides Dust Control

Teamed with good ventilation in Lancashire No. 15 is dust control provided by water on cutter bars, sprays over loaded cars and sprinkling of shuttle-car roadways with a garden hose. The 35B Jeffrey shortwall cutters have been converted to top cutters (see p. 114 of

All machinery operated in by the belt head is permissible or flame-proof, including the cable-reel shuttle cars, which discharge directly onto the belts. The 275-volt d.c. power is obtained from substations on the outside and no 2,300-volt power is taken underground. To operate mine pumps, 440 volts is brought directly down boreholes.

#### New Substation on Surface

One d.c. substation, installed two years ago at the top of a borehole, consists of a General Electric sealed-tube rectifier, on which all live parts of the machine and panels are metal-clad. This new substation operates in parallel with rotating units. It was one of the first rectifiers in the central Pennsylvania field.

Barnes & Tucker Co. operates two other mines and George Dunckuck, whose office is at Lancashire No. 15 mine, is general superintendent of all three. H. C. Caldwell is superintendent of Lancashire No. 15 mine. Isadore Wesner is chief engineer of the company, James Nicholson, safety engineer, and John O. Gill, master mechanic.

# COAL MEN ON THE JOB



E. F. Maurer, general superintendent, Rail & River Coal Co., Bellaire, Ohio.



R. M. Hess, general manager, The Morrisdale Coal Mining Co., Morrisdale, Pa.



John T. Sydnor, president, Rail & River Coal Co., Bellaire, Ohio.



A. S. Sharbaugh (left), purchasing agent for the Peale interests, Earl Mitchell, chief electrician and master mechanic, and T. L. Stafford, general superintendent of mines, Peale, Peacock & Kerr, Inc., St. Benedict, Pa.



J. Albin Linberg (left), general mine foreman, Bob Richards, night foreman, and C. A. Thompson, chief electrician and master mechanic, Maxton Slope mine, The Morrisdale Coal Mining Co., Morrisdale, Pa.



Isadore Wesner, chief engineer, Barnes & Tucker Co., Barnesboro, Pa.



Part of the supervisory staff at Arkwright mine, Consolidation Coal Co. (W. Va.), Morgantown, W. Va. Front—J. W. Kercheval (left), section foreman, Charles Porter, cager, Russell Casteel, section foreman, and Roy F. Bucklew, assistant mine foreman. Rear—Foster Kirk (left), section foreman, Carl Eisler, construction foreman, and Frank Brooks Jr., section foreman.



H. H. Kirby, superintendent, No. 3 mine, Rail & River Coal Co., Bellaire, Ohio.

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# The Foremen's Forum

## Effects of Mine-Atmosphere Qualities; Their Control by Ventilation

By JOHN W. HARRIS  
State Mine Inspector  
Bridgeport, Ohio

The qualities of mine atmosphere that affect the physiological condition of men and that can be controlled by adequate ventilation are: (1) the purity of the air and (2) its cooling power.

Pure, dry air at sea level consists of:

Oxygen ..... 20.93 percent  
Nitrogen ..... 78.10 percent  
Carbon dioxide ... 0.03 percent  
Rare gases ..... 0.94 percent

The rare gases are inert from a physiological standpoint and usually are considered with or as nitrogen. Any other gas or any excess of gases other than oxygen should be considered and treated as impurities.

If two gases are placed side by side in a chamber, they will diffuse into each other and form a homogenous mixture. The higher the specific gravity, the more slowly diffusion takes place and, conversely, the lower the gravity the faster the diffusion. Once diffusion of gases takes place, the force of gravity is not sufficient to cause them to separate.

Concentrations of gases can and do take place in coal mines as a result of inadequate ventilation, with carbon dioxide — a heavy gas — collecting along the bottom and methane at the top. These concentrations arising from specific-gravity differences are not the result of segregation but take place when a gas flows into a vessel or opening faster than diffusion can take place.

### Oxygen Depletion

Any decrease in oxygen below the normal percentage of 20.93 is termed oxygen depletion. The decrease can be caused by: (1) removal of oxygen, (2) the introduction of another gas or gases or (3) a combination of both.

Oxygen is removed from the air by: (1) oxidation (slow, or flameless burning), (2) absorption by the coal (oxidation), (3) absorption by sulphide compounds or minerals (also oxidation) or (4) absorption by water in cracks in the rock, clay or coal or dropping from the roof, which also takes up nitrogen.

Oxygen, however, is more soluble in water than nitrogen and consequently the air may be enriched in nitrogen. Air containing 17 percent oxygen has about the same effect on a man as going from sea level to an altitude of 5,000 ft. At high altitudes, the percentage of oxygen in normal air is the same as at sea level but the "partial pressure" of the oxygen is less.

It is the partial pressure of oxygen in normal air that is important in oxygenation of the blood. The physiological effect of lowering the partial pressure of oxygen by reducing the percentage in the air is the same as that resulting from reducing the partial pressure by rarefaction of the air, leaving the oxygen content normal.

As an example of the simple mathematics involved, assume 100 volumes of air made up of 79 volumes of nitrogen and 21 volumes of oxygen. What is the percentage of oxygen in the air after 25 percent of the oxygen content is removed?

1. One-quarter of 21 (21 times 0.25) equals 5.25 volumes.
2. One hundred minus 5.25 equals 94.75 volumes left.
3. The nitrogen content is equal to 79 divided by 94.75 and multiplied by 100, or 83.4 percent.
4. The oxygen content is equal to 21 minus 5.25, or 15.75, which is divided by 94.75 and multiplied by 100 to get the answer: 16.6 percent.

In addition to other ways, gas may flow into a mine and cause an oxygen depletion. The physiological effects of such depletion may result partly from reduced oxygen and partly from the nature of the particular gas. Consider a mixture of air containing 12.5 percent methane. Again assume 100 volumes, 87.5 of which is normal air (100 minus 12.5). Of this 87.5 volumes, 21 percent is oxygen. So the volume of oxygen present in the depleted air is 87.5 times 0.21, or 18.375 volumes. This figure also is the oxygen percentage.

A third cause of oxygen depletion may be the breathing of men and animals, slow combustion (oxidation) of the coal, rotting of timbers, burning of lights and so on. With any of these, the product returned to the air usually will be carbon dioxide.

Enough oxygen should be supplied

to men in confined places to keep the oxygen percentage in the places at 20 percent or more and to prevent the carbon-dioxide percentage from rising to a disagreeable level.

When a man breathes he consumes oxygen and exhales a certain volume of carbon dioxide with each breath. The ratio between carbon dioxide exhaled and oxygen consumed is known as the "respiratory quotient." This ratio, or quotient, depends upon the activity of the person and the kind of material being oxidized.

For a person exercising, the ratio is about 0.95. Where the exercise is vigorous, the ratio sometimes will rise as high as 1.0, and a man may consume as much as 3 liters of oxygen per minute. With a respiratory quotient of 0.95, carbon dioxide exhaled per minute would be 2.85 liters (three multiplied by 0.95).

In terms of cubic feet, 2.85 liters is 0.101 (2.85 times 0.03531). This is approximately the oxygen in 0.5 (one-half) cu. ft. of air. If the respiratory quotient is 0.95, the oxygen consumed is replaced by an equal volume of carbon dioxide, and breathing results in 0.5 cu. ft. of nitrogen and carbon dioxide. This we must mix with normal air in such a proportion as to keep the oxygen content at 20 percent or more.

Assume 100 volumes of normal air and diluting gas, with  $X$  as the volume of the diluting gas. Normal air contains 21 percent oxygen and 20 volumes of oxygen are to be left in the mixture. Thus, 20 equals 21 divided by 100 and then multiplied by 100 minus  $X$ . Solving this equation,  $X$  equals 100 minus the product of dividing 20 by 21 and then multiplying by 100. Thus  $X$  equals 4.77, or, say, 5. Thus, the 0.5 cu. ft. of nitrogen and carbon dioxide must be 5 percent. Consequently, the total air that must be supplied will be 10 c.f.m.

Now, the carbon-dioxide content of the air is increased by breathing. The volume of air necessary to hold the carbon dioxide at a given percentage is computed according to the following formula:

$$A = \frac{V}{X - Y}$$

Where  $A$  equals the cubic feet of air entering,  $V$  equals the carbon dioxide expelled per minute per man,  $X$  equals the permissible concentration of carbon dioxide expressed as a decimal fraction and  $Y$  equals the carbon dioxide in the entering air,

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also expressed as a decimal fraction. A therefore equals:

$$\begin{array}{r} 0.101 \\ - 0.03\% \\ \hline 0.3\% - 0.003 \\ \hline 0.003 - 0.0003 \\ \hline 37.4 \text{ cu. ft.} \end{array}$$

This 37.4 cu. ft. is the air required per minute per man. Evidently, more air is required to keep the carbon-dioxide percentage down than to keep

the oxygen percentage up to 20.

Carbide lights give off 0.0048 cu. ft. of carbon dioxide per minute.

A mule exhales five times as much carbon dioxide as a man.

Two percent of carbon dioxide will increase lung ventilation, or the breathing rate, 50 percent.

Five percent of carbon dioxide in the atmosphere being breathed is unbearable.

labelled "circuit factors." Without going too deep into this complex problem, here are a few of the controlling factors. On the power supply side of the circuit breaker, the driving force, of course, is the capacity of the power supply, limited by its impedance ( $Z$ ). For example, a transformer bank with 5.0-percent impedance can feed twenty times its kva. rating to a nearby short circuit. On the load side of the breaker the factors include reactance of the circuit conductors to the location of the short or fault and the resistance, or lack of resistance, of the short control, to some degree, the severity of the fault current. If any synchronous motor equipment can feed the short through the circuit breaker in question, that fact must also be considered.

Freeing a power system from a heavy short circuit on one of its branches is a real job for a good circuit breaker. Heavy currents set up strong magnetic fields that impose severe mechanical strains on oil-switch mechanisms. Unless the switch is strong electrically and mechanically, as well as speedy, it cannot be expected to cope with short-circuit conditions. Once an oil switch attempts to clear a short circuit, it must be able to complete that assignment, or there is real trouble. There is no backing out at the halfway point. It either opens and clears the circuit or the short circuit destroys the oil switch, and often a serious substation fire results.

In line with this discussion, an electrical survey of your mine may prove very worthwhile. Perhaps the capacity of the outdoor substation has been doubled in recent years. If so, do your oil switches have sufficient interrupting capacity to match this increase? Maybe you need to exchange the old breakers with interrupting ratings of 25,000 kva. for others with 50,000 kva. or more. It will pay you to size up your electrical layout and see if it has the short-circuit protection you think it has or hope it has. Call upon the utility company for advice. Consult your electrical supplier and his factory experts. Remember there are oil circuit breakers for every rating. Make certain that those in service have plenty of interrupting capacity.

## Operating an Oil Circuit Breaker; Interrupting Capacity Most Important

Opening or closing an oil circuit breaker (oil switch) is certainly different from opening or closing a gate. It isn't quite as simple to do and you should be much more concerned about the operation when you do it. First of all, in your hands you hold the reins to a great amount of electrical energy—at least to the extent of what the transformer substation, or the power plant or perhaps even to what the utility's power system will stand. This, of course, is not said to scare or to frighten, but merely to emphasize the importance of this operation and its manifold potentialities for doing harm, as well as good. In short, electricity is something we must respect, even in our haste to harness and keep it at work in the ever-increasing applications of mechanized mining.

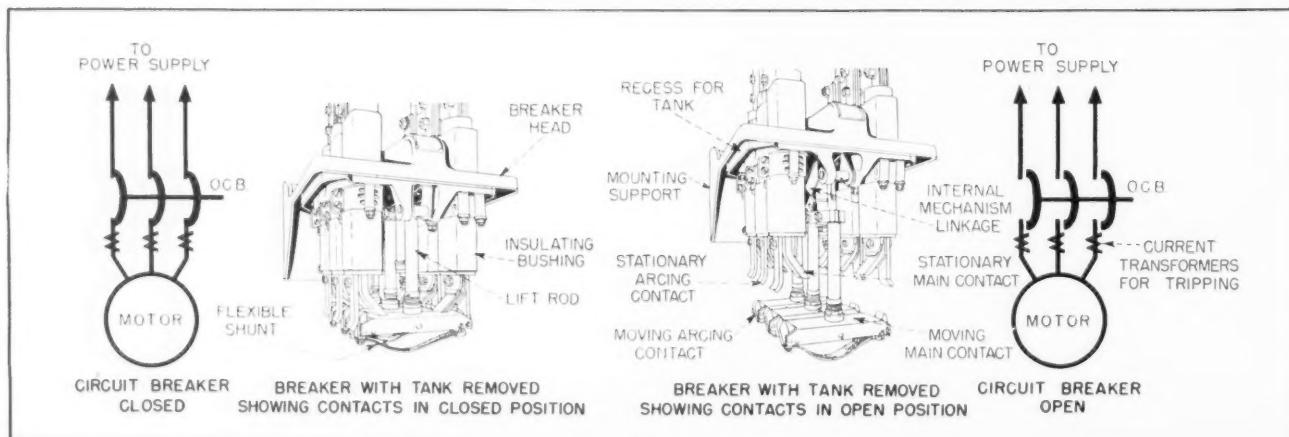
Cautiousness often leads to carelessness when a triprider or a face-boss jumps off the man-trip to close an oil switch somewhere along the line on the way to the working territory. Frequently, in closing the switch, the operator will ease the handle in instead of closing it in a positive manner. He has been known to push the handle in until the contacts just met and then backed it out again before closing the switch for good.

This method of "feeling out" the circuit is the worst operating procedure he could follow. If the circuit happens to be in trouble, this method of testing turns the circuit breaker into a fuse block. A weak spot is inadvertently created within the switch and the circuit will em-

brace this opportunity to clear itself. There have been instances where the trouble resulted in exploding the oil switch, injuring the operator and starting a fire. Operators closing oil switches by hand must be instructed that, for their own protection, they must close the switch in one quick stroke. Then the trouble will clear at some weak point on the circuit, probably where the trouble started, or at the circuit breaker if it has a current-tripping mechanism. At least, under these circumstances, the breaker contacts will have a chance to separate at a speed that will prevent undue arcing under the oil. If a circuit breaker is to be closed manually against a possible fault it should be mechanically trip-free from the closing linkage.

The accompanying illustrations show the construction of an oil switch and circuit arrangement. An oil switch has a specified current rating and is built for a certain operating voltage. The current rating is important from the standpoint of day-long power loads. Beyond this, the oil switch must have adequate interrupting capacity if it is to protect the system, itself and the circuit it feeds. It must be able to interrupt the power (ampères  $\times$  voltage  $\times$  circuit factors) that flows through it to a short circuit anywhere on the circuit it serves.

This business of figuring the amount of interrupting capacity an oil switch should have can get fairly involved. In the preceding paragraph the several circuit constants that must be considered were grouped together and



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#### What Longer Truck Life Means to You . . .

#### Why It Pays to Wait for a New Ford Truck!

It stands to reason the longer you use a truck, the less it costs to own. That's why longer-lived Ford Trucks are the top truck value. And, logically, Ford longevity means lower maintenance costs . . . less time in the shop. It means more unused miles when you're ready to trade, and a better trade-in. Yes, any way you look at it, you'll get more truck for your money with a Ford Truck . . . because Ford Trucks last longer!



*Certified  
Proof*

**FORD TRUCKS  
LAST LONGER!**

#### The life expectancy of a Ford Truck is:

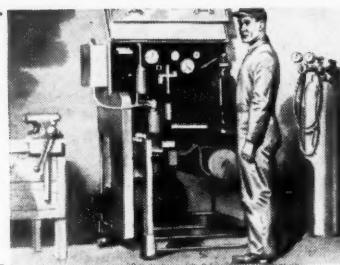
13.1% longer than that of Truck "B"  
3.2% longer than that of Truck "C"  
7.6% longer than that of Truck "D"  
19.6% longer than that of Truck "E"

#### OFFICIAL ACTUARIAL CERTIFICATE

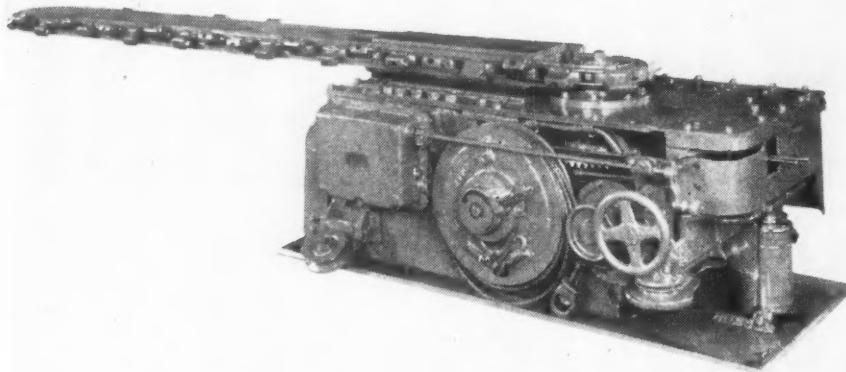
Based on the application of sound and accepted actuarial methods to the actual experience as measured by truck registrations, we hereby certify that, in our opinion, the accompanying table fairly presents the relative life-expectancy of the trucks involved.

**WOLFE, CORCORAN AND LINDER**  
Life Insurance Actuaries, New York, N. Y.

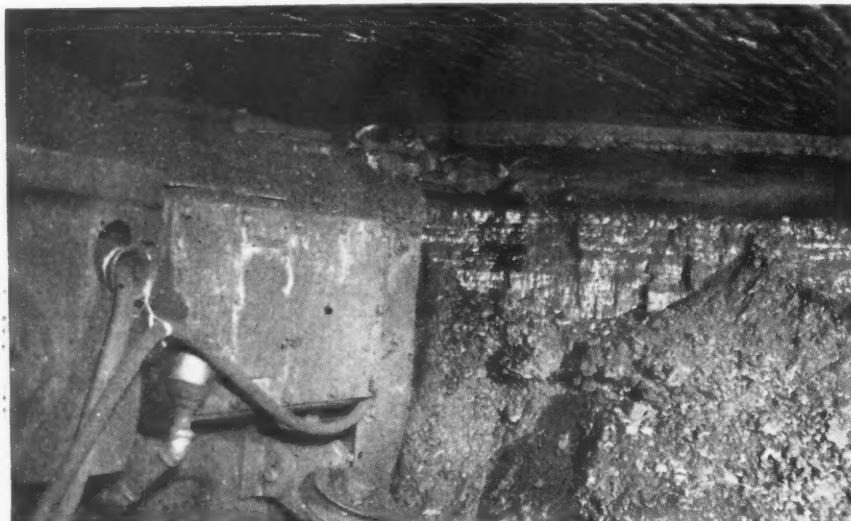
# Operating Ideas



## Changing Shortwalls to Top Cutters Improves Mining



Tapered roller bearings were applied to the longer vertical shaft that accommodated moving the cutter bar from bottom to top. All controls are at the left rear corner, including valve levers for hydraulic jacks.



Top cutting and bottom shooting leaves the top bone undisturbed, thus producing cleaner coal and providing safer roof.

EFFICIENCY OF OPERATION with loaders, shuttle cars and section belts in Lancashire No. 15 mine, Barnes & Tucker Co., Barnesboro, Pa., has been raised considerably by rebuilding the original shortwall machines to top cutters. Contamination of the coal with bone from the top has been halted and falls on shuttle car roads have been practically eliminated by the change to top cutting and bottom shooting. The design for changing the machines was worked out by John O. Gill, master mechanic, and the

work was done in the company's central shop at Mine No. 15.

Machines are permissible-type Jeffrey 35B. To accommodate the change, a new vertical shaft 8 1/8 in. longer than the original was made. Teeth were cut off the old sprocket, which was left in place to serve as the clutch. The sleeve-type bottom bearing of this shaft was replaced with a Timken bearing.

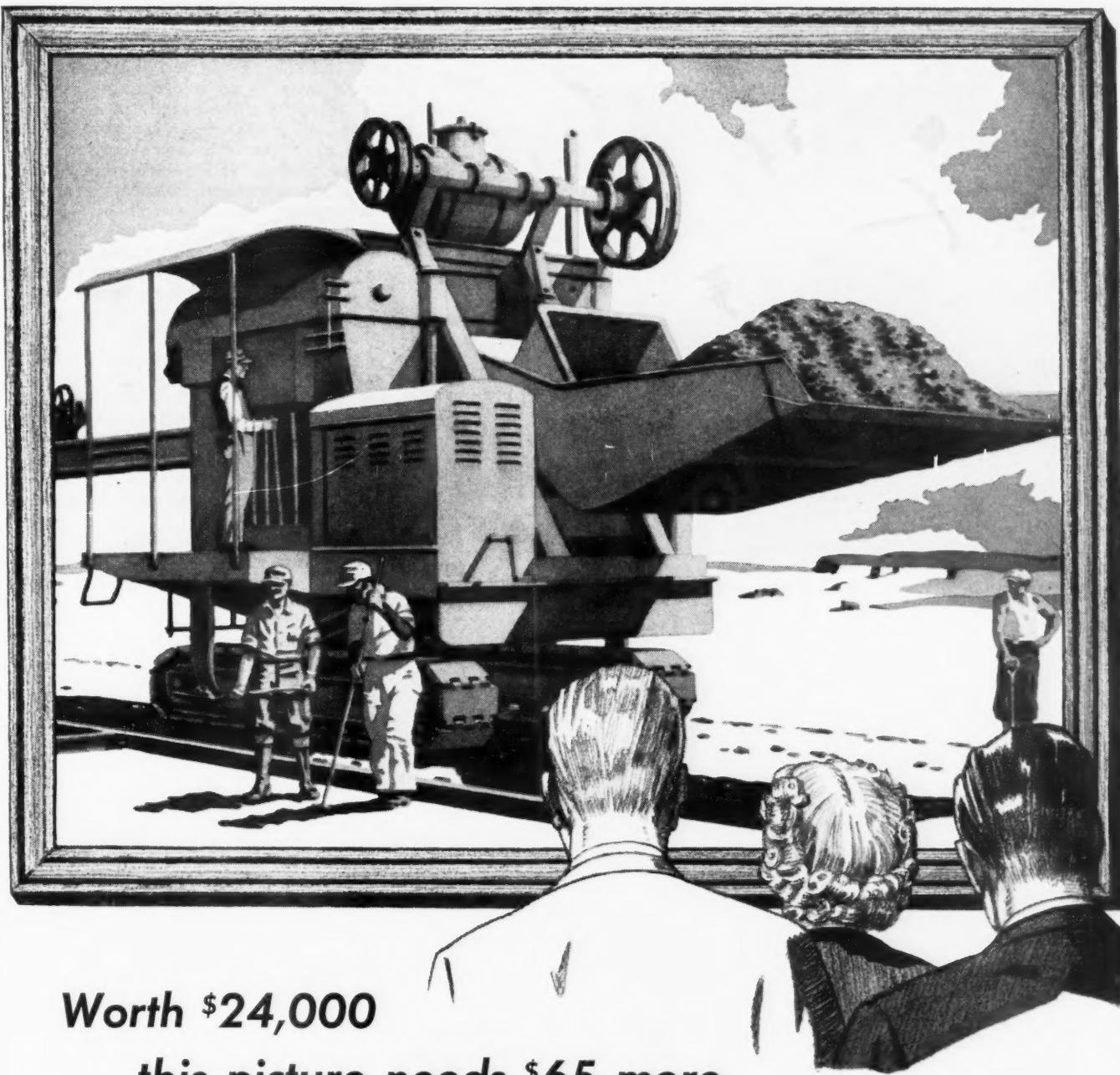
A top housing consisting of a 3/8-in. steel plate, 32 in. wide and 56 in. long, supports the cutter bar and a top

bearing, which is also Timken. The whole machine is supported on a 3/4-in. skid plate 34 in. wide and 76 in. long, with all edges turned up 2 in. at a 45-deg. angle. Three hydraulic jacks are interposed between machine and skid plate, two of which are in front and one in the rear. The hydraulic pump from a Joy 14BU loader is used and is driven through gears from the shaft which originally drove a cable reel truck.

The oil tank is underneath in the space formerly occupied by the cutter bar. Three hydraulic control levers for operation of the jacks are positioned at the left rear corner. The slow-speed clutch lever was shifted from the right to the left to bring all controls together. The hydraulic jacks were re-fashioned from head jacks of Joy 14BU loaders. Eight of the bearings of the revised cutter are lubricated through copper tubes terminating at a block on which pressure gun fittings are mounted.

Three years ago when it was deemed necessary to change to top cutting, delivery could not be obtained on new machines and this was one of the reasons for attempting to redesign the old ones. The work of rebuilding them has been carried on at the rate of about one a month. Eleven machines have been rebuilt and 9 remain to be done. Success with the design has been so marked that the Jeffrey Mfg. Co. has purchased from Mr. Gill the rights to manufacture and sell parts for similar conversions. The converted machines are termed 35BT, in which designation "T" stands for top cutting.

The three jacks have a range of 12 in., enabling the machine operator to make finger-touch adjustment of machine elevation between 32 and 44 in. to conform to height of the seam and irregularities. The Lower Kittanning or "B" seam being mined lies practically level and consists of 40 in. of clean coal overlaid with 8 in. of bone, above which is 10 to 12 ft. of draw slate. The bone makes a good roof when not disturbed by shooting. With the old method of shooting up against the bone, the roof would start, sometimes within a week, coming down on the shuttle-car road, resulting in a dangerous condition, delays and extra work.



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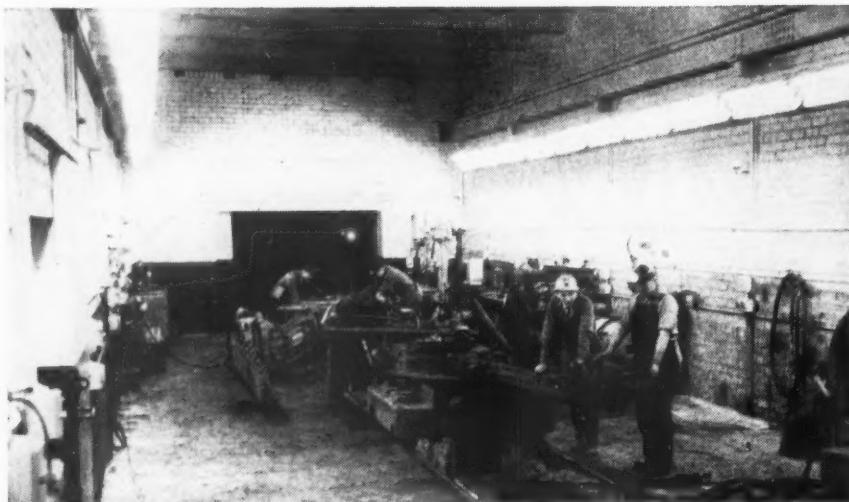
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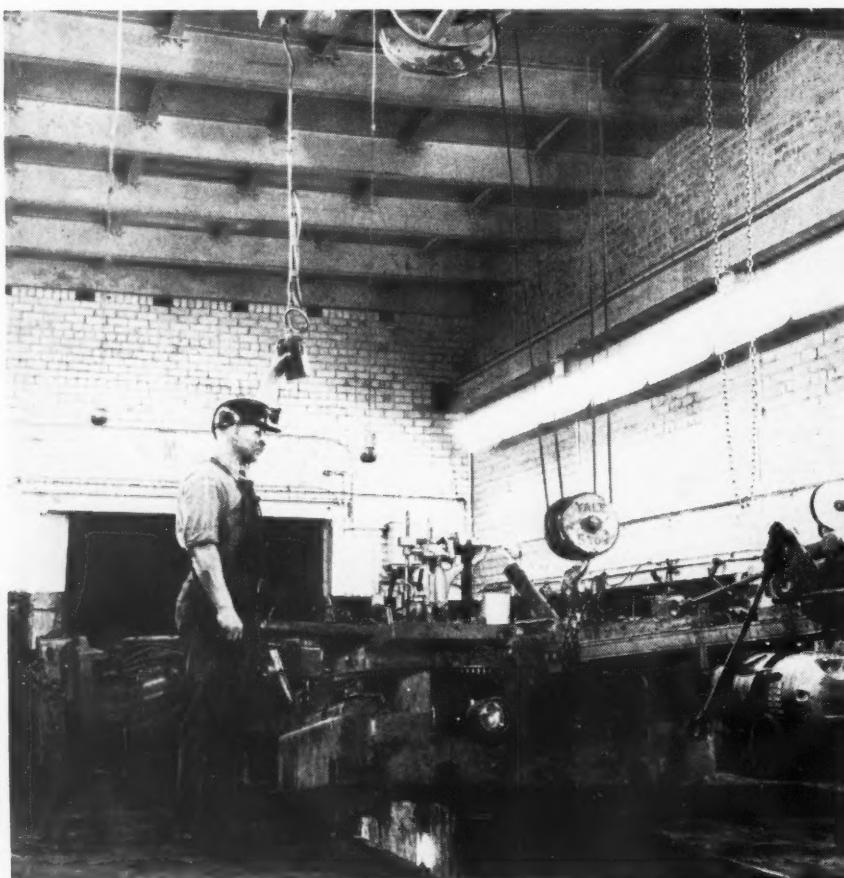
**ASK YOUR OWN WIRE ROPE MANUFACTURER OR DISTRIBUTOR**



## Special Lighting Installed in New Underground Shop



Diffused light from wall-mounted fluorescent fixtures illuminates the machinery in the center floor at 15 foot-candles or more.



Pit illumination consists of incandescent lamps in recessed reflectors directing the light upward. Upper walls and the steel ceiling of the room are covered with aluminum paint to reflect light efficiently.

EFFICIENT LIGHTING is a feature of a "front-line" underground shop put into service a few months ago at the Vesta No. 4 mine, Jones & Laughlin Steel Corp., Vesta-Shannopin Division, California, Pa. Fluorescent fixtures rim the walls of the main room and the pit is lighted by recessed fix-

tures that direct the light upward.

In this mine, which produces 8,000 tons of coal per day on two-shift operation, the new shop is eight miles underground from the portal of the main haulageway and within 1 1/4 miles of the mine workings. This shop is taking over the work for-

merly done by an underground shop 6 1/4 miles from the portal. A section of the mine near the older shop will be worked out in a few months.

The primary functions of this new shop are inspection, lubrication and exchanging rebuilt assemblies. No machine tools are included in its equipment. One grinder, a drill press and an arc welder comprise the total of motor-driven machinery in it.

Track-mounted loaders, track-mounted cutters, drills and locomotives form the bulk of equipment to be serviced. Ninety-five percent of the coal mined is mechanically loaded directly into mine cars. All face equipment is permissible and the voltage employed is 550 d.c. Gathering is done with 8-ton cable-reel locomotives with flame-proof motors and control.

The main room of the shop is 22x144 ft. and has a 15-ft. ceiling. A bridge crane with a mono-rail-type Yale 5-ton electric hoist operates close to the ceiling, so the fluorescent lighting fixtures, which are Westinghouse continuous-strip 2-lamp RLM-Type, are mounted at an angle on the side walls below the crane rails and 10 ft. above the floor.

Illumination ranges from a minimum of 15 foot-candles on top of machines being serviced in the center of the room to 30 foot-candles on a bench at the wall. The upper side walls and ceiling are covered with aluminum paint to reflect light efficiently.

To supply the fairly constant voltage required for fluorescent lamps, a separate lamp-feeder cable carrying single-phase 3-wire 115-230 volts (nominal) is brought down a 450-ft. borehole about 2,000 ft. from the shop. This borehole also contains a three-phase 440-volt cable feeding a pumping station.

Pit fixtures, also Westinghouse, use incandescent lamps and are recessed in the concrete walls of the pit and adjusted to throw the light up against the bottom of locomotives and other machines being repaired. To facilitate changing trucks, the pit is constructed with a removable section of rail on one side and with a wing pit out beyond that section.

The mono-rail bridge of the crane is electrically driven but the cross-travel is operated manually through a chain gear. The hoist push button is suspended well above the head but still within convenient reach of a man of average height. Drive of the chain hoist is a 3-hp. d.c. motor.

Wing rooms, one on each side, connect with the main room. They are 11x43 ft. and are used for storing supply items. Floors of all rooms are concrete. Roof supports are steel I-beams and the intervening spaces are covered with sheet steel.

Three crews of six men each work

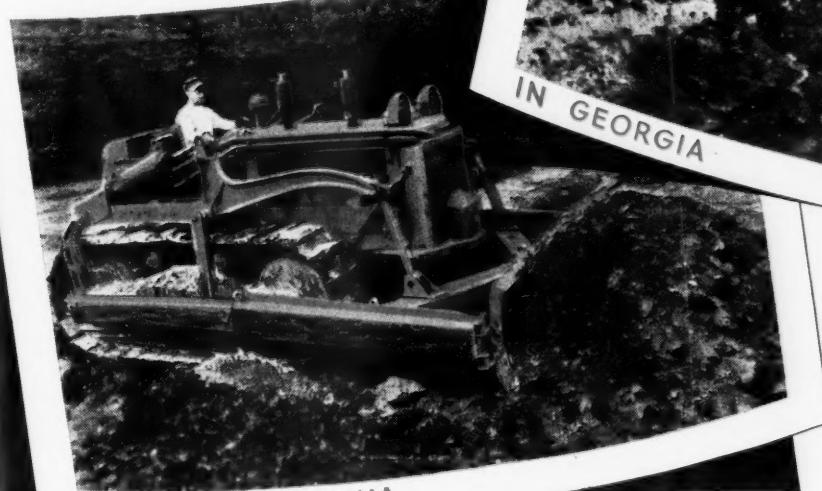
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in and from this new front-line shop. The third-shift crew has by far the greatest responsibility in keeping the equipment in good operating shape.

A new central shop to serve this Vesta No. 4 mine and the two other mines, Vesta No. 5 and Shannopin, is nearing completion and will have the best available facilities and ma-

chinery for all types of heavy and intricate repairs to electrical and mechanical equipment. It is located near a drift opening of Vesta No. 5 mine, and by an underground connection between Mines No. 4 and No. 5 is five miles from the present workings of No. 4. The new front-line underground shop at No. 4 mine is

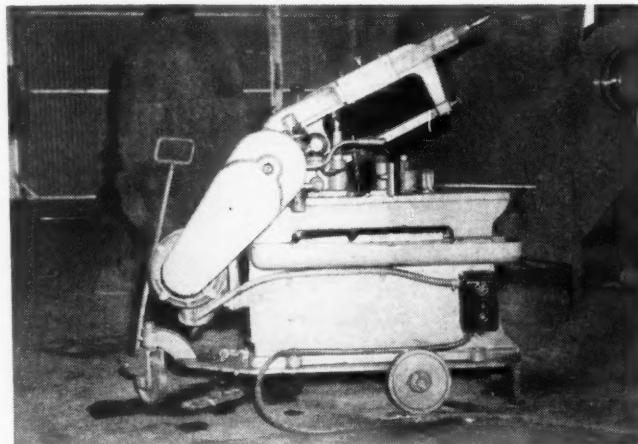
three miles closer to the new central shop than to the haulage portal.

Operating offices of the Coal Division are at California and near the No. 4 tipple. E. R. Cooper is manager of coal mines. Charles R. Drum is general master mechanic and H. J. Greismer, assistant general master mechanic.

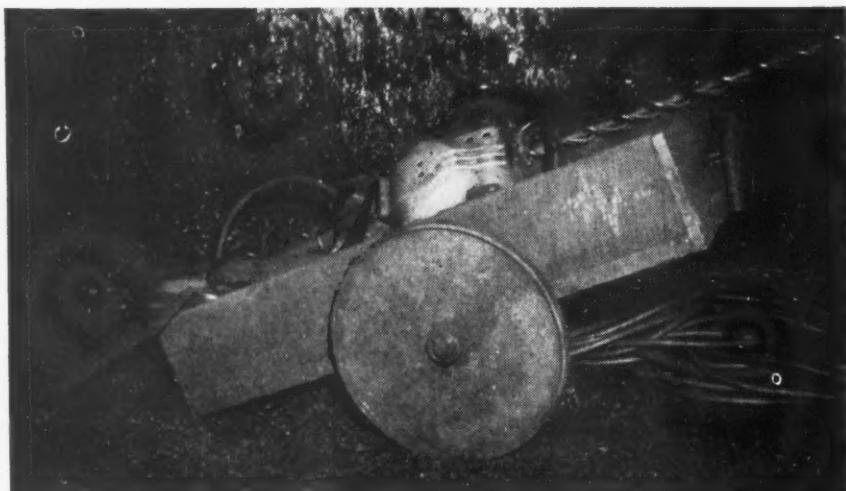
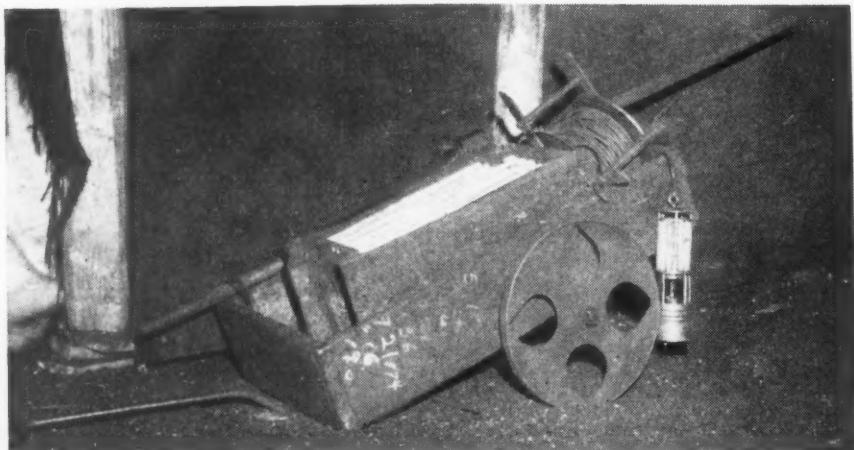
## Portable Power Saw for Heavy Shop Jobs

SHOWING THAT IT OFTEN IS EASIER to bring machines to repair work than to move heavy booms, shafts and dippers to machines, shopmen at the Tiger Mine, Hume-Sinclair Coal Mining Co., Hume, Mo., have mounted a power saw on wheels for easier maneuvering around the shop, as pictured in the accompanying photograph. When the saw is spotted at the working place, three leveling screws are lowered from the base to level the saw and keep it stationary. Plans are under way for mounting a radial drill in the same way.

Machines are moved to the job instead of jobs to the machine. Power saw on wheels avoids moving heavy repair jobs from place to place in the shop. Leveling screws hold saw steady when spotted.



## Lightweight Drillers' and Shooters' Carts Are Easy to Handle



CARTS USED BY DRILLERS AND SHOOTERS in Lancashire No. 15 mine, Barnes & Tucker Co., Barnesboro, Pa. are made as small as practical so that they are easy to pull and handy to maneuver. The plan bearing wheels, made in the coal company's shop, are the steel-disk type and the rims or treads are 1 in. wide.

On the driller's cart are carried, in addition to the Chicago-Pneumatic electric drill, the auger, a pick, shovel and 150 ft. of drill cable. Carrying extra bits is not necessary with the Kennametal augers employed.

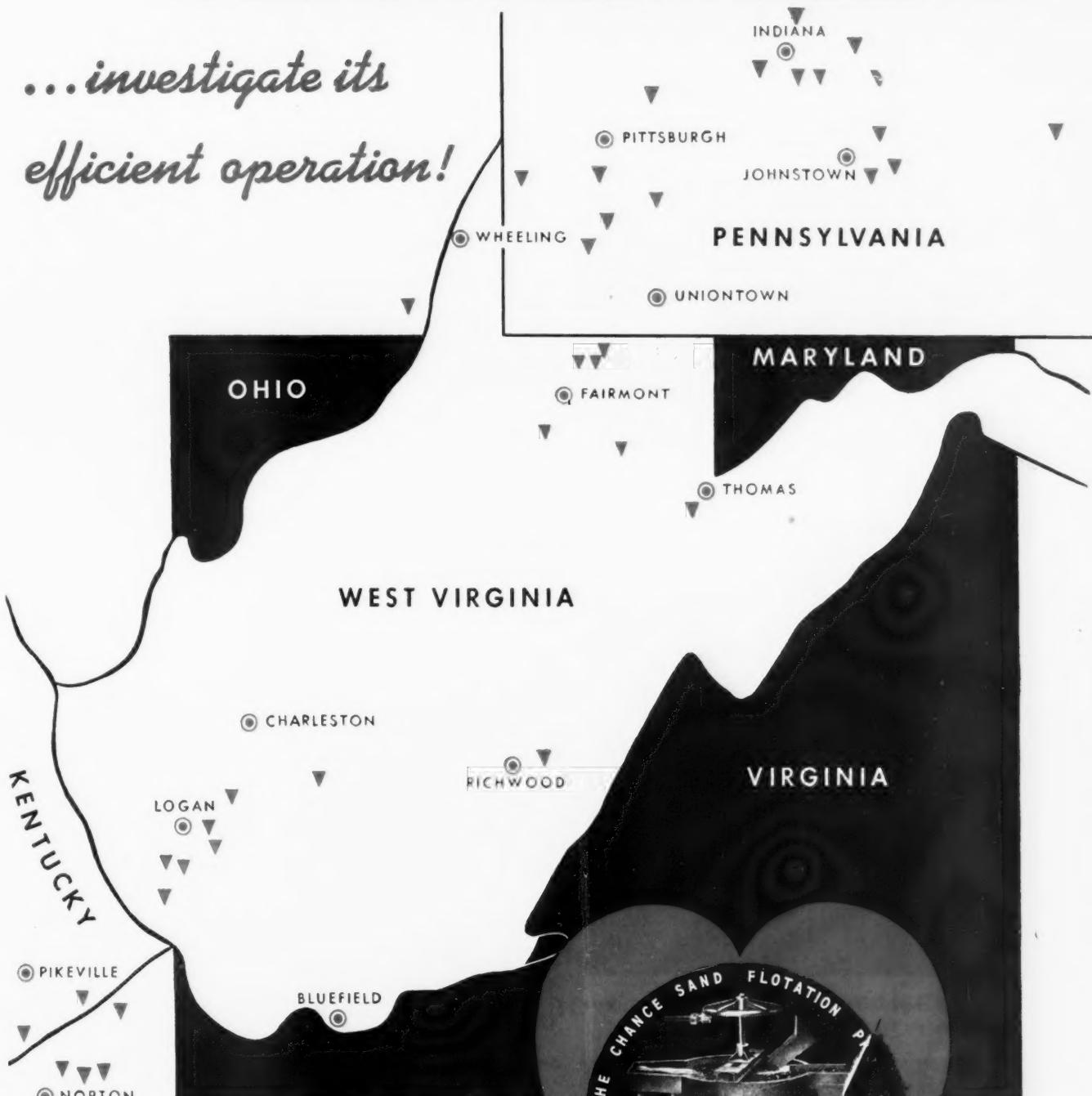
The shotfirer carries the following equipment on his cart: flame safety lamp, reel of shooting cable, shooting battery, detonators, permissible explosive, clay dummies and tamping stick.

Seam thickness in this mine is 40 in. and trackless mining is practiced in the sections. Converted Jeffrey 35B shortwall machines top cut and Joy 14BU loaders work with shuttle cars, which discharge directly onto the belt. The mine bottom is hard and there is little trouble from water on the shuttle-car roads.

Shooters' cart (top) and drillers' cart (bottom) used in shuttle-car mining in 40-in. coal at Lancashire No. 15 mine.

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## Barney Used to Spot Mine Cars



NO COUPLING AND UNCOUPLING of a rope to the trip of mine cars is necessary with a new spotting unit in use at a belt head in Mine No. 3, Rail & River Coal Co., Bellaire, Ohio. In this belt and duckbill work there is plenty of room for long trips of empty cars in by the loading point. The new unit is a Brown-Fayro barney-type car spotter.

Principal parts of the unit are a section of prefabricated track somewhat longer than two mine cars and a traction-type reversing hoist mounted alongside of that section of track. In the center between the two track rails are two other rails set on edge and spaced about a foot apart to guide a barney fitted with a gravity dog that catches on the bottom of the car. Heavy tubular braces from the base of the hoist to the side sheaves and other braces from these sheaves to the track keep the hoist and track in correct position.

After the car trimmer has, by successive steps, inched the trip forward and completed the loading of two cars, he pushes a reverse button and the barney returns to the other end and stops by action of a limit switch, ready to catch on another car.

The top of the dog on the barney can be seen under the car as it moves back to the left where it will get a new hold and advance the trip two more cars.

## Bucket Elevator Removes Slurry



Fred Bowen, general superintendent, displays one of the spare buckets for the slurry elevator.

REMOVING THE  $\frac{1}{2}$ -MM. SLURRY from the settling tank helps to hold the density and viscosity of washery water at normal and saves running part of the water to waste to get rid of the settling, says Fred Bowen, general superintendent, New Castle Mine, Windsor Coal Co., Windsor, Henry County, Mo.

In washery operation, if the size consist in the returned circulating water is not held within limits, the density and viscosity of the polluted circulating water increases and larger and heavier particles are caused to float. This vicious cycle continues. To curb this action, a bucket elevator, shown in the accompanying illustrations, was installed to drag out and dewater the  $\frac{1}{2}$ -mm. slurry from the settling tank. The elevator with perforated buckets,  $\frac{1}{8}$ -in. holes, travels slow enough for the material to lose most of the water before it is dumped into the refuse cone. Dewatering, of course, conserves make-up water. In the refuse cone, the material mixes with the refuse from the McNally-Norton wash boxes and is trucked away to a refuse dump.

A  $7\frac{1}{2}$ -h.p. 1,500-r.p.m. General Electric gear motor (25.5 to 1 ratio) is used to drive the bucket elevator.

Left—where the dewatered slurry (center) mixes with other refuse from the washery in the refuse cone.



## Ideas Count!

Often, it is the solution to the little trouble that counts the most. Sometimes a simple change makes a machine click—or an idea work. If you have successfully put to work at your property a mechanical, electrical, operating or safety idea—big or little—why not tell us about it? If accepted, Coal Age will pay you \$5 or more for each one publication.

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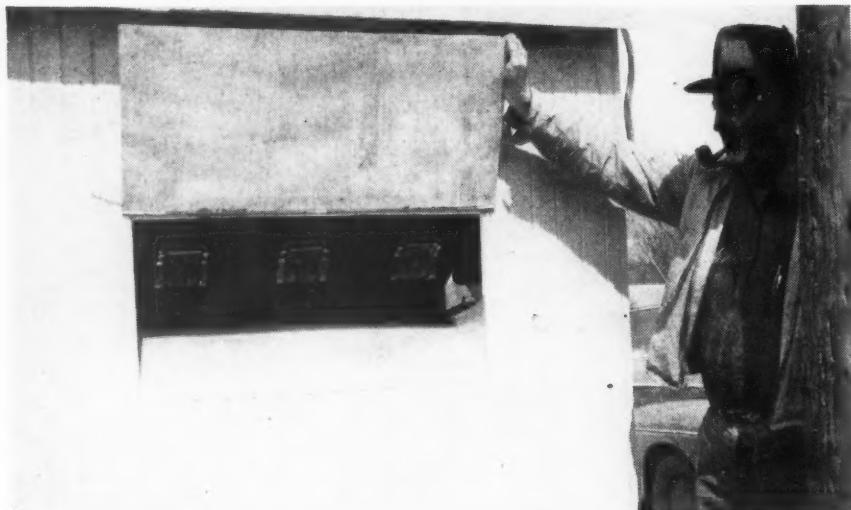
## Portable Hydraulic Lift Eases Shop Work



HEAVY PARTS ARE HOISTED and moved by a portable hydraulic lift in the shop of the Tiger mine, Hume-Sinclair Coal Mining Co., Hume, Mo., as shown in the accompanying photograph. The two components of the lift are a hydraulically operated stand, Model A-154, and a Model 2000 boom, both manufactured by the Miller-Way Co., San Francisco and Oakland, Calif. The 6-ft. boom can be extended to 9 ft. Retracted, the boom supports 2,000 lb. and can be raised to 6 ft. above the floor. Extended, it supports 500 lb. and can be raised to 9 ft. above the floor.

Hydraulic lift, partly extended, hoists a heavy crawler pinion for transfer to another part of the shop. W. A. Humphrey, mechanic, is standing by.

## Cut-Out Adds Safety in Portable Substation



HINGED SHEET-METAL FLAPS opening to the outside serve as relief doors for primary fused cut-outs in a portable substation at the Reliance mine of the Crowe Coal Co., Clinton, Mo. The flaps, as shown in the accompanying photograph, are hinged at the top and are located just behind the cut-out switches. The primary cut-outs are tilted forward at the top so the open end is exposed to the relief door. When a fuse blows, the relief door swings out, acting as a relief for an otherwise tight substation housing.

Cut-out relief door on portable substation is held open by J. R. Burnett, superintendent at the Reliance mine of the Crowe Coal Co.

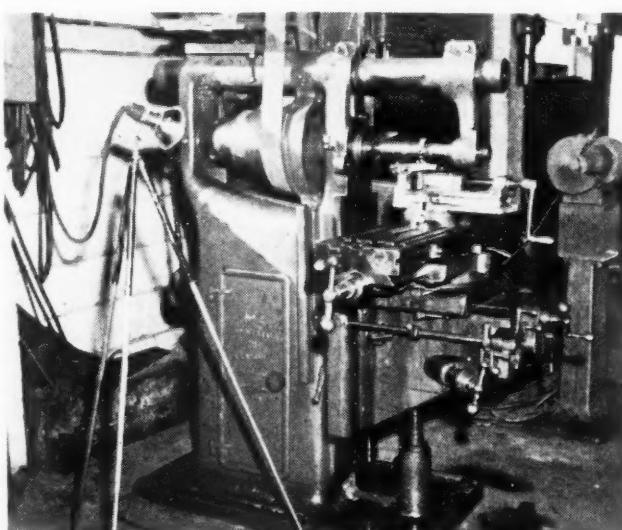
## Sealed-Beam Lamp on Tripod Serves Shop Tools

MECHANICS OFTEN LOSE a lot of time trying to find some place to set an extension lamp. Too often the lamp falls and breaks the filament of the bulb. Nothing but a super-duper general illumination suffices to completely eliminate the need for extensions in the shop. Even the flexible arm type of light attached to each machine tool is not a complete solution.

An extension light of concentrated beam, which can serve any one of several machines and can be adjusted to practically any position required, was rigged up by John Duda, general mechanic in the central shop at the new service center of Mine No. 3, Rail & River Coal Co., Bellaire, Ohio.

It consists of a 115-volt sealed-beam lamp in a socket mounted with a ball and socket joint on an adjustable tripod. In this case, the tripod is a camera type with sturdy telescoping steel legs of good length.

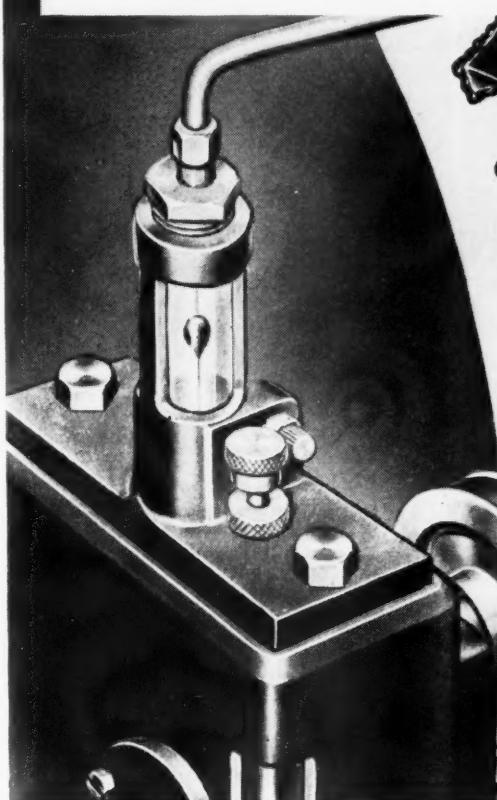
Spot lamp on tripod can serve several machines and has a wide range of adjustment.



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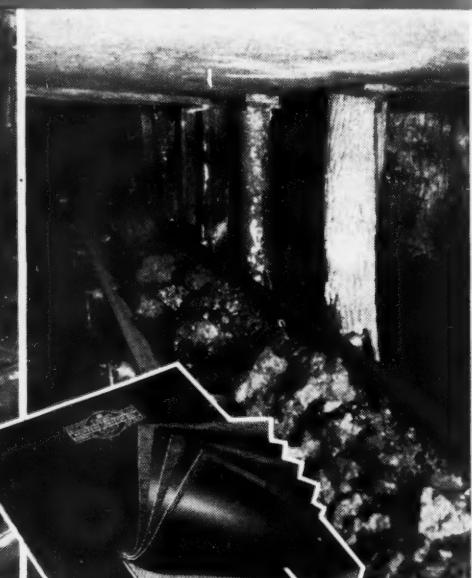
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# News Round-Up



## Government Mine Operation Ends June 30 After Contract Negotiations Break Down

For the first time in 13 months, the coal industry, at the end of June, could again expect to do business as a privately owned and operated industry, as the expiration of war powers officially ended government seizure on June 30. But while the operators once more had control of their industry, whether coal would be mined was a considerable question even a few days before the government's release. Contracts between the union and the two operator groups were yet to be negotiated, and unless they were concluded by July 8 it was improbable that the miners would return to work after their ten days of vacation. In effect, the industry was no closer to a working agreement after 13 months of government operation than it was at the time of seizure, May 29, 1946.

With the Taft-Hartley bill made into law by the overriding of the President's veto by the House on June 20 and the Senate on June 23, resumption of bituminous wage negotiations was expected momentarily. Whether recess of the two sessions was either a "breathing spell" or a "war of nerves," as various reported in the press—or the ostensible inability to agree on the part of the union and the two operating groups—the desire of all concerned to await the fate of the labor bill was thought to be a vital factor.

Passage of the Taft-Hartley Act over President Truman's widely publicized veto represented the first major change in the nation's labor law since the Wagner Act became effective in 1935. Proponents of the bill forecasted a new era of equality of union and employer before the law, as contrasted with the generally recognized labor-bias of the Wagner Act. Though bitterly denounced by union leaders as a "slave law," and termed by the President as "shocking" . . . "deliberately designed to weaken labor unions" . . . "unworkable," the bill represented more than five months of work by Congress laboring under what it has regarded as the nation's mandate to redefine worker-employer relations. Proponents failed to see in it the "death knell" to unions claimed—rather the imposition on them of responsibility for their actions and due regard for the public and the nation as a whole.

Within a few days after the bill became law, according to reports, more than 250,000 miners in various states had stopped work in protest. Earlier in the month some 15,000 miners in western Pennsylvania had staged a several days' stoppage in protest as the bill first went to the President. Threats of nation-wide strikes, tests by the courts and other measures to combat the bill were issued immediately upon its passage by many union groups.

The contract discussions between the northern and western operators and the union were the first to break down, when Chairman Ezra Van Horn announced May 31 that "This meeting is adjourned by joint assent." Later that day, Charles O'Neill, as spokesman for the operators, stated that "very wide differences between the operators and the United Mine Workers" had become evident. The U.M.W. had asked for an eight-hour portal-to-portal day with a 30-minute lunch period, he said. In reply, the operators offered to pay for eight hours "on the basis of the national pattern." On top of the base rate of \$1 an hour, and the additional rate of 18½c. in the Krug-Lewis agreement, they had suggested an additional 15c., for a total hourly rate of \$1.335. Mr. Lewis demanded, he said, "a rate and shortening of hours that would amount to \$1.535 per hour, bringing the total take-home pay for 1½ hours less work to \$13.05, as contrasted with the \$11.85 for nine hours under the Krug-Lewis agreement." The operators estimated that the union's rates would raise the cost of production by 70c. per ton, "plus some other collateral demands of which we can't estimate the cost at this time."

In regard to the union's proposal for increase in the welfare-fund levy from 5c. to 10c. a ton, the operators, Mr. O'Neill said, had been willing to consider establishment of the fund at 5c. a ton, but with joint union-operator administration and a third trustee to be jointly selected.

The operators also were reported to have proposed that the Federal Mine Safety Code be accepted as it now stands, but with a joint safety committee of two miner and two operator members to review rulings of the Bureau of Mines and recommend

and make revisions of the code if found necessary. An umpire would be selected in case of a disagreement. Substantial agreement on the powers and duties of the mine safety committees were reached, Mr. O'Neill reported.

An increase of 5c. ton also was estimated for the union's proposal for six holidays, the \$100 vacation pay and payment for time and a half for Saturday work and double time for Sunday. As against the operators' request for a contract from July 1, 1947, to April 1, 1949, without a reopening clause, the union suggested a contract mutually cancellable on 30 days' notice, it was stated.

End of the southern negotiating conference came officially June 7, when Chairman Lawrence E. Tierney announced that it was recessed under rules of the conference subject to recall by the chair. Miner representatives had failed to appear since the previous Wednesday, June 4, when operators the day before held a press conference and outlined their proposals. In the morning session, June 3, the union representatives had strenuously objected to the proposed press conference, and were reported to have stated that it would end the conference. A miner's motion in the meeting that the conference should be adjourned if the operators' statement was released, was not carried.

On June 4, John O'Leary, vice president of the U.M.W., released a statement in which he called the operators' proposals a "phony contract offer," and said that it should be obvious that there was no use wasting time talking it over. In explaining the miners' absence, Mr. O'Leary was reported to have said: "One of the first acts of the conference was to try to agree to reach a wage agreement by collective bargaining without resorting to a newspaper battle. The operators violated this agreement by holding a press conference on June 3 in an effort to deceive the public into believing that they had made a legitimate wage proposal to the U.M.W." The union was understood to have submitted to the southern group substantially the same proposals placed before the northern operators.

In its press conference, the Southern Coal Producers' Negotiating Committee outlined in full its suggestions for a contract submitted to the union May 29. On wages and hours, an eight-hour face-to-face day at a daily rate of \$12.70, with a 15-minute lunch pe-

## Taft-Hartley Labor Law

### Effective Upon Passage

1. The government may obtain 80-day injunctions against strikes that endanger national health and safety.

2. Suits for damages may be filed in federal courts against unions for breach of contract, jurisdictional strikes and secondary boycotts.

3. Union welfare funds established since Jan. 1, 1946, must be jointly administered by union and management and must fulfill only those purposes stated in the law.

4. Voluntary consent of individual workers is required for checkoff of union dues.

5. Expenditures or contributions from union funds in connection with political campaigns for federal offices are barred.

6. A new federal Mediation and Conciliation Service replaces the conciliation service now under the Department of Labor.

7. Strikes by government workers are forbidden.

8. Free speech is guaranteed employers provided there is no threat of reprisal or promise of benefits.

9. A joint congressional committee is established to study industrial relations and observe the operation of the new law.

### Effective 60 Days After Passage

1. Foremen are excluded from the guaranteed collective-bargaining rights of the Wagner Act, though they may form unions and employers may deal with them.

2. Unfair practices may be charged against unions for coercion of employees or employers, refusal to bargain collectively, attempts to impose "featherbedding" practices and other offenses.

3. Jurisdictional strikes and secondary

boycotts are forbidden and the NLRB may seek injunctions against them.

4. The closed shop is forbidden in new contracts.

5. The union shop in new contracts must be approved by a majority of a plant's employees in an election conducted by the NLRB. The union may dismiss union-shop workers only for failure to pay dues.

6. Sixty-day notice of contract termination is required of unions and employers. Strikes and lockouts are barred until after the 60-day period.

7. Employers and workers are given greater freedom in requesting NLRB elections to determine union recognition or decertification.

8. Unions must file detailed reports of finances and internal affairs with the Department of Labor if they desire protection of the act.

9. To obtain NLRB recognition for their union, officials must file affidavits disclaiming Communist-party membership or affiliation with any group seeking overthrow of the government by force.

10. Membership of the NLRB is increased from three to five and it becomes, in effect, a labor court. Administrative work is taken over by a general counsel.

### Effective on Various Dates

1. Closed- and union-shop provisions of present contracts remain in force until the agreements expire. Closed- or union-shop contracts signed within the next 60 days may not remain in force for more than one year.

2. Provisions covering the checkoff and union welfare funds now in operation do not apply until current contracts expire or until July 1, 1948, whichever date is earlier.

riod, was offered, an increase of 85c. a day over the present portal-to-portal day at \$11.85. The committee said, "We oppose a welfare fund in principle and as contained in the Krug-Lewis agreement. We do, however, reiterate our willingness to jointly explore the need for a fund for the alleviation of hardship cases arising directly from employment in the coal industry." If the need was found and a fund established, he said, they would insist on joint administration, a limitation on the maximum size, with payments being discontinued at that point and resumed when an established minimum was reached, a transfer to the fund of that part of the Krug-Lewis fund contributed by operators in the group, and the advance establishment by mutual agreement of rules, regulations, limitations and restrictions covering the fund's operation.

In regard to safety, the operators said, "We seriously object to the inclusion in the agreement of federal control of all safety conditions in the coal mines." While they were willing to accept by contract such federal supervision as may be necessary to insure maximum safety with respect to explosion hazards, on regular routine safety inspections and safety provisions other than these, better re-

sults would be obtained by state supervision, it was said. Curtailment and revision of the authority of the mine safety committees and their subordination to management at all times, also was proposed. Safety committees as such were not opposed and it was suggested that proper safeguards be established to insure full consideration of their recommendations and grievances concerning safety.

On vacation payments, the return to a vacation payment of \$100, contingent on a year of continuous service, was asked. Exemption of all properly qualified supervisors, confidential and technical employees from any contract to be negotiated also was a major point in the operators' proposals.

## New Developments

• Purchase of the S. J. Patterson Coal Co., of Dayton, Ohio, including mines and sales agencies in Ohio, West Virginia and Kentucky, was announced last month by Walter Bledsoe & Co., Terre Haute, Ind. Among the properties involved is the Weyandoke Coal & Coke Co., Arista, W. Va., producer of 1,200 tons of Pocahontas No. 3 coal daily. The firm was established in 1872 by Stephen J. Patterson and his brother, John H. Patterson, who also

was founder of the National Cash Register Co. Robert D. Patterson, son of Stephen Patterson, was president of the company until his death. Harry E. Cohn, vice president and general manager of the company and associated with it for many years, is expected to join the Bledsoe organization.

• The opening of three new mines is planned by the Peabody Coal Co., Chicago, according to a report to stockholders made last month by Stuyvesant Peabody Jr., president of the company. One mine is to be in Saline County and two in Christian County, Illinois. Purchase by Peabody of the Penwell mine of the Southern Coal Co., at Pana, Ill., also has been reported. Peabody was understood to have exercised an option it had held on the property since early this year. A core test reportedly completed early last month was said to have revealed an 8 1/2-ft. seam at a depth of 703 ft. The N. Y. Central R.R. announced June 5 that a 1 1/2-mile spur line from its St. Louis branch to the site of the new shaft was being planned.

• The newly organized Glen Mary Coal Co. has been awarded, for \$490,000, the leasehold rights on the mine developed during the war to supply all the coal used at the Oak Ridge atomic-bomb plant, according to an announcement by H. W. McMenaway, regional director for the WAA. The lease on the Scott County mine, formerly operated by the Brimstone Coal Corp., has 22 years to run and covers 138 acres of surface land and 1,400 acres of underground land. The new company is owned by Arthur Guthrie, Pittsburgh, Pa., and Dr. J. E. Johnson, Dr. E. M. Howard and Louis H. Green, of Harlan, Ky.

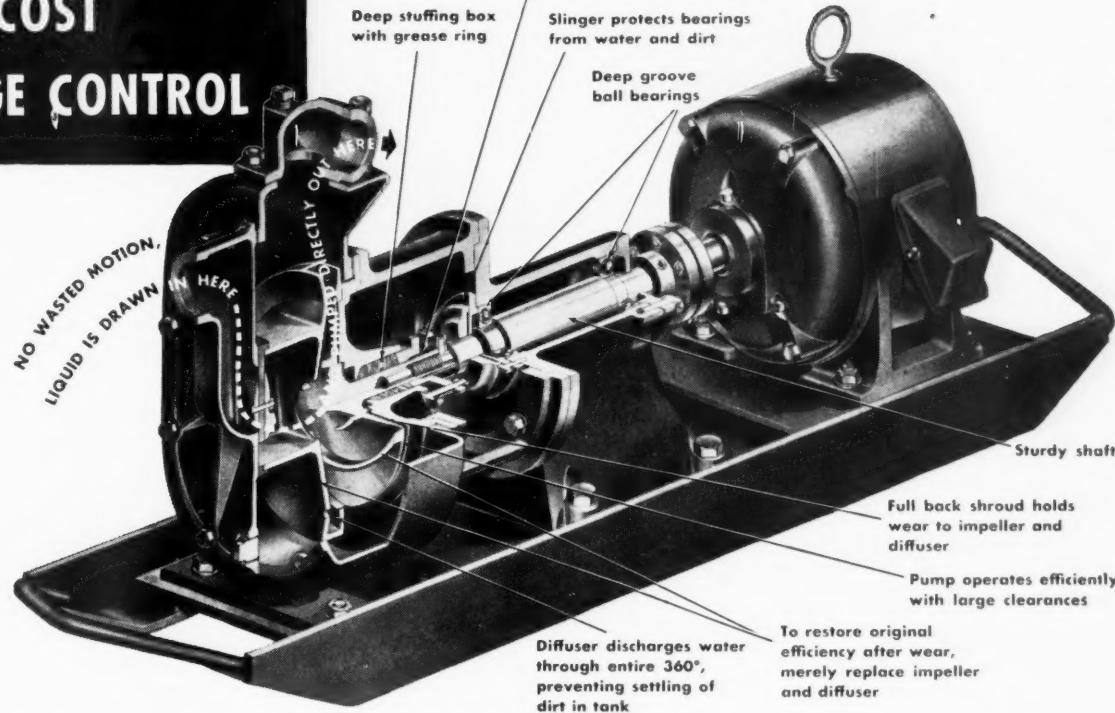
• Purchase of the Watson Coal Co., Paris, Ark., by Bill, Gordon and Harold Hixson, was recently announced. The name of the company is to be changed to the New Watson Coal Co., it was said.

• The Bern Coal Co. has leased to the Benchley-Marsh Coal Co., New Lexington, Ohio, 2,800 acres of coal-stripping land near Lathrop, in Bern Township, according to Gordon Tolliver, president of the company. Stripping operations will begin in about 60 days, it was reported.

• Sam Bates, Whitesburg, Ky., truck-mine operator, is reported to have begun construction of a large coal-loading ramp at Deane, Ky., on the new Rockhouse Creek branch of the L. & N. R.R. now being built to open up undeveloped coal areas. The ramp will serve a number of truck mines and Mr. Bates is expected to open several new mines himself. The new Hendrix mine of the Consolidation Coal Co. (Ky.) now being developed (*Coal Age*, June, 1947, p. 140) is located in this area.

• Investigation during recent months of the Twentymile park area of Routt County, Colorado, by representatives

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of the Leavell Coal Co., Tulsa, Okla., is reported to have proved large tonnages of coal suitable for stripping. It is understood that efforts are now being made to arrange for a rail connection and a sufficient power supply to handle large stripping units. A rail line not less than 12 miles long would be needed, it was said.

• The Kentucky State Game & Fish Commission recently announced that 950 acres of land, at Flat Wood, Ky., purchased in 1938 for a reservation, will be sold for coal land. Recent core drillings indicated large coal deposits and proceeds of the sale will be used to purchase other land for a reservation.

## Pittsburgh Consol Plans Smokeless Fuel Plant

Construction of the first of a series of smokeless fuel plants to be built in coal-using centers throughout the nation will be started immediately at Champion, 19 miles west of Pittsburgh, according to an announcement issued June 4 by officials of the Disco Co., a subsidiary of the Pittsburgh Consolidation Coal Co. The \$3,000,000 plant will use more than 1,000 tons of high-volatile bituminous daily in a low-temperature coking process that will refine the coal tar into a number of chemicals and will produce 800 tons daily of smokeless solid fuel. The plant also will produce 280,000 tons of coke annually.

Chemical products turned out at the Disco plant annually will include 1,400,000 gal. of tar acid oil, 1,250,000 gal. of creosote, 950,000 gal. of fuel pitch and 5,000 tons of pitch coke. Production at the Champion plant is scheduled for the fall of 1948.

## B.C.R. Annual Meeting Marks Progress

Reports including coal technology, utilization and the coal-fired gas-turbine locomotive summed up a year's advances at the annual meeting of Bituminous Coal Research, Inc., in Columbus, Ohio, June 3-4. About 150 coal-company executives and engineers were present for the Tuesday sessions, which included a morning meeting to hear reports and an afternoon inspection tour of BCR projects under way at the Battelle Memorial Institute. On Wednesday, a special meeting of the Technical Advisory Committee was held at Battelle.

"BCR in Action" was the theme of the annual membership meeting, presided over by Howard N. Eavenson, president. A dozen speakers, presented by Dr. H. J. Rose, director of research, BCR, reviewed the mining-development program, laboratory activities, progress by the Locomotive Development Committee, hand-fired smokeless stoves and furnaces, residential stokers, coal-flow problems, coal-drying investigations, locomotive

fuel improvements and problems, and over-fire air jets for industry.

Fifty percent of the funds requested for research in mining development already have been raised by enlistment of 13 coal companies, seven land companies and four railroads, it was announced by E. R. Kaiser, assistant to the president, BCR, who spoke at the Tuesday morning meeting. At the same session, John I. Yellott, director of research, Locomotive Development Committee, stated that all major problems in developing the coal-fired gas-turbine locomotive have been solved on a small scale and that full-scale tests of coal-handling and combustion equipment will be under way shortly at Fontana, Calif.

Research on carbonization, gasification and chemical reactions was summed up by Dr. H. C. Howard, assistant director, Coal Research Laboratory, Carnegie Institute of Technology, who stated that studies on the rate of burning of pulverized coal particles are being extended to higher pressures. BCR projects at Battelle were reviewed by B. A. Landry, supervisor, fuels division, Battelle Memorial Institute. Mr. Landry summarized work on hand-fired smokeless heating equipment and introduced four of his associates, who described other BCR programs at Battelle, as follows: Dr. H. W. Nelson, assistant supervisor, fuels division, who spoke on residential stokers; R. B. Engdahl, assistant supervisor, fuels division, who discussed the coal-air flowmeter for pulverized coal, fluid fuel and air; A. C. Richardson, supervisor, coal preparation division, who summarized work done on drying fines; and E. D. Benton, assistant supervisor, fuels division, who told of recent developments on the application of steam-air jets on road locomotives as well as switchers.

Three more speakers brought the Tuesday morning meeting to a close. W. S. Major, development engineer, BCR, reported increasing installations of over-fire air jets by industry in the interest of smoke abatement and J. R. Garvey, development engineer, BCR, summed up plans for the commercial development of smokeless heaters. T. A. Day, special representative, BCR, reporting on BCR membership, pointed to a present roster of 256 coal companies and associations, 63 of which were added in the last 24 months; 14 railroads, five of which were added in 1946-47; and three equipment companies, all added since 1945. Participating coal companies represent 184,773,664 tons annually, he stated.

Other BCR projects, as reported by Dr. Rose, include the following: improved designs for coal-heated homes, control of acid mine drainage, coal drying and agricultural uses for coal.

Concluding the morning meeting, J. E. Tobey, chairman, Technical Advisory Board, invited attention to a bright future for bituminous, especially in wide expansion of electric

utilities, and introduced members of the Technical Advisory Board who attended the meeting. H. A. Glover, chairman, Sales Advisory Committee, also presented members of his committee who were present.

After luncheon at a downtown hotel, representatives of member companies toured the Battelle laboratories to inspect smokeless stoves and furnaces, development work on fully automatic stokers and conventional units and industrial and railroad projects.

Detailed technical reports were submitted by members of the Battelle staff at the meeting of the Technical Advisory Board on Wednesday. These reports included hand-fired residential equipment, residential stokers, stoker applications, industrial utilization, residential group heating and cooling and coal-burning steam locomotives. E. C. Payne, chairman, Motive Power Committee, reviewed recent tests of locomotive fuel performance and Dr. Rose reported on improved house design for solid fuels.

Two new directors of BCR were elected at the annual meeting: George Dunglinson Jr., vice president (traffic), Norfolk & Western Ry., Roanoke, Va., and P.B.C. Smith, president, Southern Coal Co., Inc., Memphis, Tenn. Five other members were reelected, as follows: H. N. Eavenson, president, Eavenson & Auchmuty, Pittsburgh, Pa.; B. R. Gebhart, vice-president (sales), Chicago, Wilmington & Franklin Coal Co., Chicago; J. B. Morrow, president, Pittsburgh Coal Co. of Pennsylvania Pittsburgh; M. L. Patton, vice president, Truax-Traer Coal Co., Cincinnati; and R. D. Stockdale, president, Red Jacket Coal Sales Co., Columbus, Ohio.

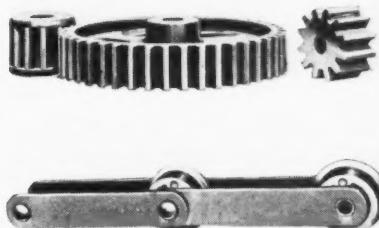
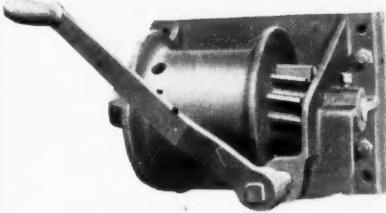
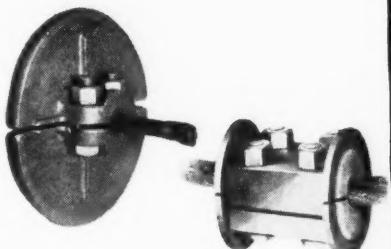
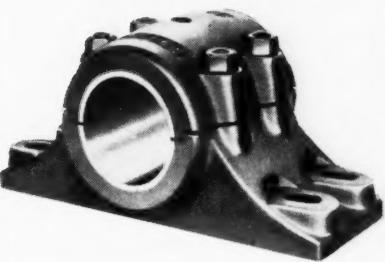
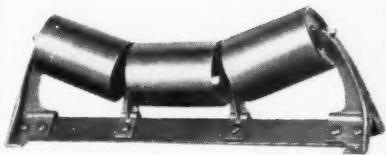
All BCR officers were reelected at a board meeting following the annual membership meeting, as follows: Mr. Eavenson, president; R. H. Sherwood, president, Central Indiana Coal Co., Indianapolis, vice president; Mr. Morrow, vice president; Dr. Rose, vice president; M. L. Garvey, Washington, D. C., treasurer; C. A. Reed, secretary, and J. F. Hanley, assistant secretary and treasurer, both of Washington, D. C.

## Safety Developments

Moves to improve safety and health, including legislative proposals, mine shutdowns and payments from the miners' health and welfare fund, were reported in various areas during the month.

In the anthracite region, payments of \$1,000 from the anthracite health and welfare fund were made June 6 by the U. M. W. to survivors of the 15 men killed at the Nottingham colliery of the Glen Alden Coal Co. Jan. 15, and 10 men who died Apr. 10 at the Schooley colliery operated by the Panzitta Coal Co. Checks went to 18 widows who attended the special ceremonies at Scranton and checks

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were handed to five the next day who had been unable to attend the Scranton meeting. Payments to two others were being held up because of legal technicalities.

Earlier, on May 24, the U.M.W. announced the establishment of a \$575,000 fund at the Jefferson Medical College, Philadelphia, for research and treatment of silicosis and other occupational diseases found among some anthracite miners. The program, financed by the Anthracite Health and Welfare Fund Foundation, will provide for treatment, care and rehabilitation of patients at the college's two divisions in Philadelphia and White Haven. Announcement was made June 11 that 450 miners at the Pine Ridge colliery of the Hudson Coal Co., Wilkes-Barre, had volunteered for an experiment aimed at preventing anthracite-silicosis. The experiment will involve daily inhalation of an aluminum-dust preparation before entering the mine. Aluminum dust is said to counteract the effects of silica dust.

Elsewhere, in Christopher, Ill., it was announced that a new hospital, financed by nearby locals of the U.M.W., was nearing completion and probably would be opened in June. Medical treatment will be provided for miners and their families in the area.

In Beckley, W.Va., officials of U.M.W. District 29 stated that a new union-management mine safety program, including daily "reminder talks" before each day's work, would go into effect in the New River field in June, under an agreement reached at a joint meeting between mine owners and workers. According to C. E. Jones, safety director, U.M.W. District 29, this was the first joint operator-miner conference on safety in mining history.

In Washington, a House labor subcommittee on June 3 received a bill that would authorize the Department of the Interior to close for 30 days any coal mine reported unsafe by federal inspectors. If the owners declined to correct conditions and worked anyhow, they could be fined \$5,000 and sent to jail for a year. The bill was introduced by Rep. Landis (R., Ind.).

In Harrisburg, the Pennsylvania House of Representatives on May 29 passed and sent to the Senate the Flack bills, which would require weekly examinations of all anthracite mines by foremen using a flame safety lamp to detect gases and would require mine operators to establish and show clearly on the map furnished the mine foreman a stopping distance of not less than 100 ft. from an inaccessible workings.

In Illinois, where Robert M. Medill, former director of the State Department of Mines and Minerals, and Robert Weir, assistant director of the department, were under indictment charged with "palpable omission of duty" in connection with the Centralia

## EQUIPMENT APPROVALS

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in both April and May, as follows:

**Joy Mfg. Co.** — Type 11BU-10APE/F loader; two motors, 4- and 50-hp., either 250 or 500 volts, d.c.; Approvals 575 and 575A, respectively; April 14.

**Baker-Raulang Co.** — Type TJBX and TJCX mine tractors; two 48-volt, battery-operated motors; Approval 576, covering both types; April 16.

**Jeffrey Mfg. Co.** — Class 48 distribution box, 220 volts, a.c.; four branch circuits, 250, 45, 45 and 20 amp., respectively; Approval 577; April 25.

**Joy Mfg. Co.** — Type T2-6PE/F mining-machine truck; two 4-hp. motors and one cable-reel motor, either 250 or 500 volts, d.c.; Approvals 578 and 578A, respectively; May 2.

**Goodman Mfg. Co.** — Type 97-C-30 belt conveyor, 25-hp. motor, 440 volts, a.c.; Approval 579A; May 19.

**Joy Mfg. Co.** — Type 14BU-7C loading machine; four motors (either 7 1/2- or 10-hp.) and one 4-hp. motor, either 250 or 500 volts, d.c.; Approvals 580 and 580A, respectively; May 20.

gating the Centralia disaster, a Senate committee in Washington on June 5 blamed, in some degree, all the principals involved—management, miners and state and federal governments—and recommended federal corrective legislation to prevent further disasters. The committee stated that the Federal Mine Safety Code "was in fact the longest stride yet made toward the establishment of a federal safety standard for the coal mines," but that "no positive steps" were taken by the CMA to eliminate the explosion hazard. The report alleged safety violations by the miners, miner opposition in some cases to safety measures and ignorance by the mine committee of its own authority to recommend closing the mine. "The first and most essential step," the committee concluded, "is the enactment by Congress of legislation that will not only raise the standard of safety but give the federal government the power it now lacks to enforce that standard."

Assistant director Weir and former director Medill requested changes in venue on June 9, contending that they would not receive a fair trial in Washington county on charges contained in the indictments. Earlier, as the Centralia explosion became an issue in an election to the Illinois Supreme Court, the Centralia Mine Co., which was sold to the Peabody Coal Co. in May, was given until June 10 to answer to two indictments charging "willful neglect," and similar extensions were granted Messrs. Medill and Weir.

Elsewhere in Illinois, officials of the Peabody Coal Co. announced CMA permission to reopen Mines Nos. 57 and 59 on June 11 and 10, respectively, and to use black powder with delayed detonators for blasting. The mines had been closed on May 27 by a federal inspector for violations of the federal code on blasting with black powder. Only a week earlier, the Peabody Coal Co. had become the first local mine operator to contribute toward a new community disaster truck fund in DuQuoin, Ill., with a donation of \$100.

Opposing any effort to ban the use of black powder, John McCann, president, P.M.W., dispatched a letter to Gov. Dwight Green on June 2, claiming that "the fact that all men must be out of the mine when shot firers are shooting with black powder is an adequate enough safety precaution."

In Louisville, Ky., on May 27, the Kentucky Court of Appeals ruled invalid the 1946 act of the legislature that compelled employers engaged in hazardous occupations to operate under the workmen's compensation law. This means that the state workmen's compensation law reverts to its former status of being optional, with the added proviso that hazardous occupations must operate under it or carry sufficient insurance to cover payment of liability claims arising from the death of any employee due to conditions of his employment.

lia disaster on Mar. 25, the Republican majority of a General Assembly investigating commission submitted a report on May 21 recommending legislation to (1) place state mine inspectors under civil service and require them to check mines monthly; (2) increase the number of inspectors from 16 to 25; (3) make soliciting or acceptance of campaign funds by state inspectors or mine department officials a felony; (4) prohibit on-shift shooting with explosives; (5) establish additional mine rescue stations and set up mobile rescue units; (6) raise mine ventilation standards; (7) require more extensive rock dusting; (8) ban smoking and the use of open-flame lamps in gassy mines; and (9) require that shotfirers be hired where coal is broken down by explosives. Four Democratic committeemen did not sign the report but planned to submit their minority findings later.

Later, a member of the investigating commission promised that four bills would be introduced into the Illinois legislature to change the state's mining safety laws. Three of the measures would include major recommendations of the investigating commission. The fourth, to be introduced by the four Democratic members of the commission, would be an effort to take the Department of Mines and Minerals "out of politics."

Reporting its findings after investi-

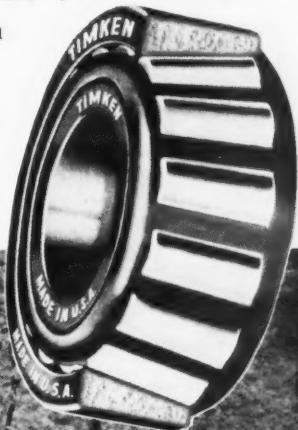
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C. M. Donahue (left), and J. T. Ryan Jr., Mine Safety Appliances Co.; Thomas Allen, Colorado, temporary chairman; C. L. Lutton, retiring president; Mr. McCreery, representing the Governor of Colorado; and C. A. McDowell, institute secretary. Mr. Ryan was chairman of the program committee.



Installation of officers—Frank Hillman (left), Alabama By-Products Corp., officiating; J. A. Jeffreys, Iowa; R. Harry Thomas, Kentucky; C. A. McDowell; Dr. J. J. Rutledge, Maryland; and R. Dawson Hall, New York.

## Greater Safety in the Mining of Coal Theme of Inspectors' Meeting

Ways and means of promoting mine safety, including lessons to be learned from recent fires and explosions, methods of organizing to cope with mine disasters, ventilation, discipline in relation to safety, grounding, recruiting and training of miners, diesel locomotives underground, methods of improving the efficiency of state mining departments and coal mining in Alaska and France, were the themes of the 37th annual convention of the Mine Inspectors' Institute of America, at the Shirley-Savoy Hotel, Denver, Colo., June 2-4.

Program arrangements were in charge of John T. Ryan Jr., general manager, Mine Safety Appliances Co. Thomas Allen, Colorado chief inspector of coal mines, opened the ses-

sions as temporary chairman, turning the gavel over to C. L. Lutton, H. C. Frick Coke Co. (retired), retiring president, who was succeeded by C. P. Kelly, chief mine inspector, Virginia Department of Labor and Industry. Springfield, Ill., was selected as the site of the 1948 meeting.

The contribution of mining safety equipment in protecting the country's armed forces in World War II was the subject of the first technical session June 2, with John T. Ryan Jr., general manager, and C. M. Donahue, manager, mining department, Mine Safety Appliances Co., in charge, assisted by Earl Allen, D. F. McElhattan and Chet Bowler.

Tracing the development of their company and contrasting conditions

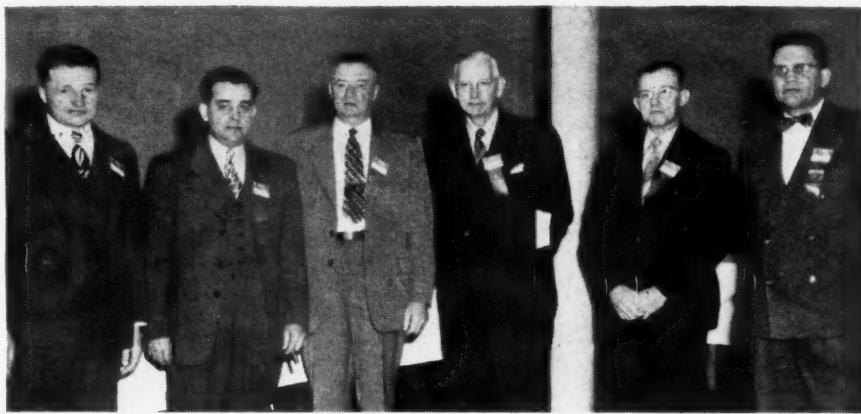
in the two wars from the standpoint of available protective equipment, Messrs. Ryan and Donahue explained and demonstrated some of the 75 pieces of equipment used during the war by the armed forces—all developed from equipment designed for the mining industry. Among them were: the Navy "lung" and aircraft oxygen and breathing apparatus; underwater breathing apparatus for use in establishing beachheads, improved face pieces for gas masks, other types of self-contained breathing apparatus, "Velocity Power" tools, oxygen-demand apparatus, the "Chemox" apparatus for damage control and rescue in naval operations, a smokeless and flameless chemical for grenade fuses now used in a heating unit for first-aid work, "Ear Defenders" for gun crews, helmet liners patterned after the "Comfo-Cap," gas detectors for aircraft use, now adopted for fire detection, and so on.

All these and other items, said Mr. Ryan, would not have been possible without the interest and cooperation of the mining industry in developing, buying and using the peacetime modifications. The industry, he emphasized, deserves real credit for what it has done in protecting men and it is a story that should be told to prevent a recurrence of press and radio attacks in the future. He asked the participation of all men in coal mining in putting the facts before the public.

Lessons to be learned from recent mine explosions keynoted the June 3 session, with bleeder airways and discipline in safety as added topics. Discussing two explosions April 18 and Sept. 19, 1946, at the Great Valley mine of the Great Valley Anthracite Coal Corp., McCoy, Va., Mr. Kelly, in a paper read in his absence by Robert Bradford, federal mine inspector, McAlester, Okla., analyzed both the mine conditions and the explosions themselves, pointing out that in driving entries in fault territory recently, methane was suddenly liberated in large quantities under considerable pressure. Ignition of such outbursts was the cause of both the explosions in question.

Firing of a shot resulted in the burst of methane in both instances. In the first explosion, state authorities contended that a burning fragment of explosive caused the ignition, with federal authorities contending that a non-permissible locomotive was the cause. Consequently, both, plus a blower-fan motor, were listed. State authorities ordered the employment of shotfirers with fireboss experience, testing for gas before and after each shot and keeping the locomotive out by the last crosscut.

In the case of the second explosion, on the same entry and in the same fault area, the outburst of gas was ignited by a battery locomotive, which met the gas in its travel. "Since the last explosion," said Mr. Kelly, "We realize that an outburst is likely to



June 3 session—F. J. Peterzell (left), The Union Pacific Coal Co.; Dennis Keenan, Pennsylvania; Andrew Wilson, Pennsylvania anthracite; Orr Woodburn, Arizona; Robert Bradford, federal inspector; and Dr. Harold L. Walker, Illinois.



June 4 morning session—J. J. Huey (left), The United Electric Coal Cos.; C. G. Marshall, Tennessee Coal, Iron & R. R. Co.; M. D. Cooper, National Coal Association; Richard H. Dalrymple, Utah; Walter Hornsby, Kentucky; and W. C. Painter, Independent Coal & Coke Co.



June 4 afternoon session—Ronald C. Oliver (left), Oliver Coal Co.; J. H. East Jr., U. S. Bureau of Mines; Burr L. Aton, The Eagle-Picher Mining & Smelting Co.; Ford Sampson, Ohio Coal Association; C. H. Maize, Pennsylvania; and W. R. Cunningham, Pennsylvania.

occur at any time while work is being done in the fault areas, and that all sources of ignition must be eliminated if possible. While the company is getting permissible equipment, we have stopped all work in the fault areas. When the equipment is 100-percent permissible, we will permit work to be resumed in the fault areas,

but will require that this work be done off-shift—that is, drilling and shooting."

Cutting into old works and liberating gas as a result of an incorrect map was the underlying cause in the Jan. 15, 1947, explosion at Nottingham colliery, Glen Alden Coal Co., Plymouth, Pa., declared Andrew Wil-

son, inspector, 7th Anthracite District. Of the five possible sources of ignition, four—shooting, an arc from a cutting-machine controller, a trolley locomotive and smoking—were eliminated or thought to be not-too-immediate possibilities. A fifth source—a defective safety lamp—could not be definitely proved since the lamps were demolished.

Lessons to be learned, said Mr. Wilson, are as follows:

"An accurate survey should be made at least once every six months and all extensions placed on the mine maps and on the tracings from which the blueprints furnished the colliery officials are made.

"That all coal companies make a thorough study of their maps and tracings, with the view of having placed thereon all extensions which were made prior to the last survey, and are not presently shown on their maps.

"In the event these uncharted extensions are found in inaccessible abandoned workings which cannot be surveyed, distances of sufficient accuracy may be found in the yardage books. However, where such distances are taken from a yardage book, this fact should be noted on the map.

"In every case where workings are approaching inaccessible abandoned workings, the coal company should establish and clearly show a stop distance on the map furnished the colliery officials, and such stopping point should not be passed until after the coal company officials, the mining engineer and the mine inspector have studied the situation and have agreed on the place or point at which the drilling of test holes should be started."

The Centralia explosion March 25 was definitely a dust and not a gas explosion, said Harold L. Walker, director, Illinois Department of Mines and Minerals. It was definitely, in his opinion, the result of firing permissible explosives in a non-permissible manner, since, among other things, investigation revealed that coal-dust was used extensively for stemming and holes generally were lightly tamped.

Lessons to be learned, said Dr. Walker, include the one that dust can explode as well as gas; also, that dry and dusty conditions should be regarded as hazardous enough to warrant withdrawing men, that partial rock-dusting leads to a false sense of security, that shooting with all men out of the mine should be the rule in the future and that a knowledge of barricading would have saved several lives. Forecasting a substantial revision in the Illinois mine law, Dr. Walker stated that some good things would result, along with some not so good, with the attitude of the miners as a factor to be considered.

"Fires are difficult to prevent but can be held to a minimum," said Dennis J. Keenan, inspector, 15th Pennsylvania Bituminous District, in a re-

cial of methods of organizing a mining district to function in case of mine disasters, using the organization in his own district as an example. "Explosions are inexcusable because their cause and effective preventive measures are known." Explosions are a challenge to the industry. "Can it meet the challenge and eliminate fires and explosions? In the interim, an effective disaster-recovery organization is advisable because, without one, much valuable time is lost, lives of entombed men are further jeopardized, additional property damage is suffered and the lives of those engaged in rescue and recovery work are needlessly jeopardized. It cannot be over-stressed that, without an efficient emergency organization, suitable and adequate materials and proper procedure, the hazards of mine fires and explosions will be greatly increased."

Under the 15th District set-up, two calls from the disaster-affected mine are all that are necessary to start the organization functioning to provide men, telephone service, fire apparatus, ambulance and hospital facilities, supplies and materials, first-aid and rescue teams, police assistance and doctors and nurses. Committees regularly coached in their duties by meetings and simulated disasters are the mainstay of the organization.

Pooling of the resources of several organizations would provide greater facilities for disaster work, declared Orr Woodburn, director, Globe-Miami District Mine-Rescue Association, Globe, Ariz., in a discussion of Mr. Keenan's paper. He also felt that a public-relations set-up could well be made a part of such organizations. In copper mining, there is little chance of explosions but fires are a major hazard. Operators in his area pooled their facilities and formed the association in 1918. The cost has been about 1c. per shift per man employed. "Mine-rescue training is on a definite monthly schedule. We occasionally have maneuvers that use the whole organization for as many as three days. Only a few minor fires have occurred, which were promptly extinguished or isolated, and there has never been a resulting injury, loss of life or anyone imperilled at any member property."

"Because of its intimate relationship to the lives and health of mine workers," contended George H. Sambrook, safety director, H. C. Frick Coke Co., and the U. S. Coal & Coke Co., the advisability of providing bleeder headings for gob areas "should receive the close, personal attention of the members of the safety, engineering and operating departments of any coal company."

Methane production, falls, generation of carbon-dioxide in fall areas, the increasing use of electrical machinery and the fact that gases are subject to expansion and contraction are factors in the bleeder problem. Under certain conditions, Mr. Sam-

## M.I.I.A. Officers

C. P. Kelly, chief mine inspector, Virginia Department of Labor and Industry, was elected president of the Mine Inspectors' Institute of America at the Denver meeting, succeeding C. L. Lutton, H. C. Frick Coke Co. (retired). Other officers were chosen as follows:

Vice presidents—John E. Jeffreys, Iowa State inspector; Griff Morris, director, Indiana Bureau of Mines and Mining; R. Harry Thomas, chief, Kentucky Department of Mines and Minerals.

Secretary—C. A. McDowell, director, industrial labor relations, Vesta division, Jones & Laughlin Steel Co.

Assistant secretary—J. J. Forbes, U. S. Bureau of Mines.

Treasurer—Dr. J. J. Rutledge, chief engineer, Maryland Bureau of Mines.

Editor-in-chief—P. J. Friel, Pennsylvania anthracite mine inspector.

Assistant editor-in-chief—Richard Maize, Pennsylvania Secretary for Mines.

Publicity editor—R. Dawson Hall, Coal Age (retired).

Assistant publicity editor—Lot H. Jenkins, Martins Ferry, Ohio.

control enforced by penalization. Accident prevention in our coal mines, and other coal mines throughout the United States, is systematically planned education of hazard elimination, with the welfare of the worker as the primary objective. This systematically planned education is accomplished on our property by what is considered safe operating rules, which have been compiled only after the analysis of both fatal and non-fatal accidents in order to prevent recurrence of same."

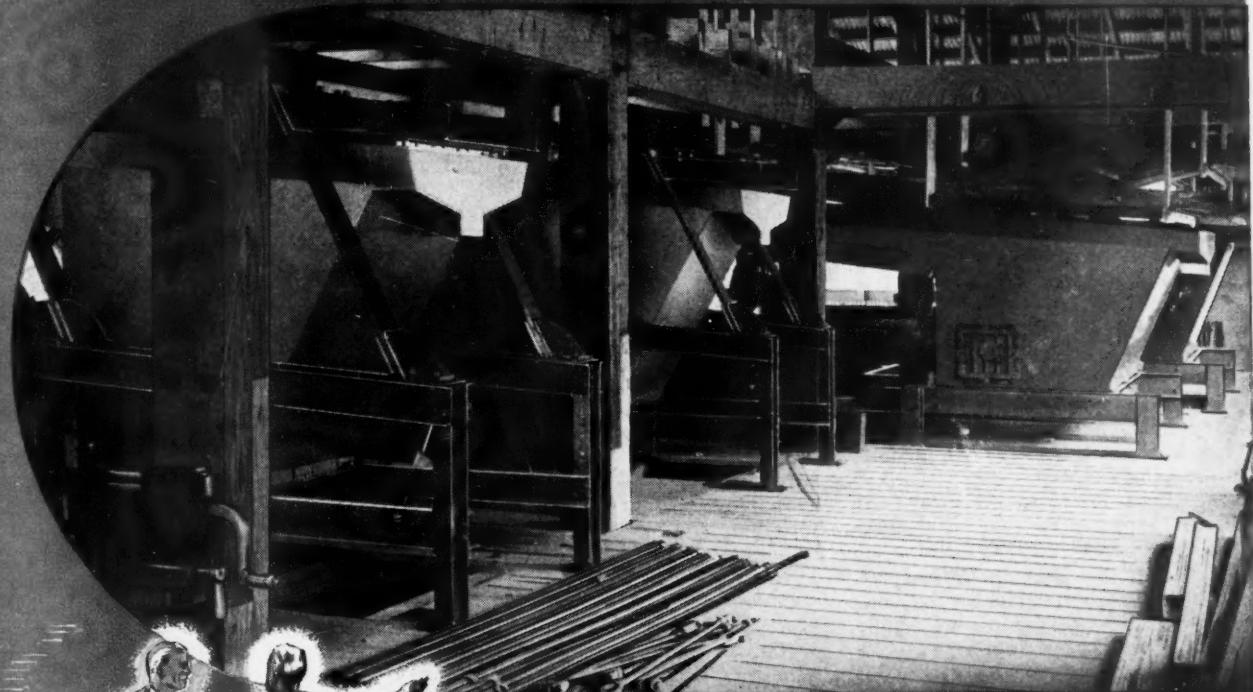
Analysis of accidents at his company's mines, Mr. Peternell concluded, resulted in the conclusion that the main requisites in further accident reduction are: (1) education, (2) supervision and (3) discipline. "Our employes are subjected to education by instruction through state mine laws, company operating rules, compulsory first-aid training and mine-rescue work. Supervision must see that the physical conditions of the mine are not neglected at any time. The rigid enforcement of our safe operating rules and state mining laws by supervision and, when necessary, discipline, helps make officials and mine workers safety conscious and contributes greatly to reducing coal mine accidents."

Grounding of electrical equipment and recruiting and training mining men were the subjects of the morning session June 4. In opening the session, Thomas R. Weichel, mining-electrical engineer, U. S. Bureau of Mines, Mt. Hope, W. Va., in a paper read by Earl Maize, supervising engineer, mine inspection, Denver, stated that "to reduce the shock hazard on portable electric equipment, it is of prime importance that the metal frames be kept as near 'earth potential' as possible. This can be done, in the majority of instances, by providing an electrical connection between the machine frame and a low-resistance ground, such as the track circuit in a d.c. system or by means of a fourth wire or system-grounding conductor in an a.c. system."

In most mines, said Mr. Weichel, track is the most effective grounding medium. Conveyors generally can be grounded effectively by two methods: (1) a separate wire bonded to conveyor frame at 200-ft. intervals and (2) use of the grounded power conductor (less desirable). Where a.c. is used, grounding depends upon the system employed. "One of the most common and reasonably effective methods of grounding present-day conveyor systems consists of a main grounding conductor originating on the surface and extending underground to the frames of electrical equipment. Grounding relays can be installed in the grounding circuit to remove power from the equipment or system in event of a ground fault."

Where d.c. is employed, Mr. Weichel further stated, use of the recently developed ground-trip circuit breaker "has been subjected to tests under

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actual mining conditions and shows considerable merit in limiting ground-fault currents to below a harmful value. It also affords good protection for trailing cables containing ground-conductors." To make sure that grounding remains effective, frequent checks should be made by a competent person.

### Grounding Underground Units

"The grounding of all underground equipment that may in some way acquire an electrical potential from its metallic frame to ground has long been accepted as the most effective method of insuring against electric shock," declared C. G. Marshall, electrical engineer, coal mines, Tennessee Coal, Iron & R.R. Co., Birmingham, Ala., in discussing grounding of stationary units underground. "To obtain a low-resistance ground connection, it is necessary: (1) to use a conductor of low resistance and of sufficient capacity to carry the maximum fault current to ground . . . and (2) that provision be made for a low-resistance connection of the conductor both to the equipment frame and to ground or earth."

To get low resistance, a solid connection, preferably with a terminal lug, is necessary. The ground resistance of a track circuit can be further reduced if all pipelines are properly bonded to the rails. "The resistance between ground and rail will vary at different mines. Each installation should be checked to ascertain if the resistance value is sufficiently low to be accepted as a safe ground. This value, in my opinion, should not exceed 3 ohms."

Discussing T.C.I. grounding practice, Mr. Marshall outlined it as follows: all 2,300-volt underground cables are protected by high-interrupting-capacity circuit breakers with overload protection and lightning arresters at all points where the cables enter the mines; wire-armored cables are suspended and the messenger wire and armor are grounded to the mine track at one end to prevent damage to the armor; m.g.-set frames, metal handles of 2,300-volt gang-operated disconnect switches and metal frames of all control panels grounded to the track by separate conductors not less than 4/0 in size; all three units of rectifier stations grounded to the track by 4/0 or larger conductors; two separate positive leads or one lead fastened to the mine track at two different points are installed to reduce the possibility of an open circuit in rectifier operation; insulating mats are used in front of all control panels and switches; and pump frames (with motors and controls), as well as dumping stations, belt drives, conveyor frames and so on are grounded to the track with separate conductors no smaller than the current-carrying conductors.

"Frequent, thorough inspections are made by the maintenance depart-

ment and the local safety inspectors to insure installation and maintenance of safety ground wires on all equipment." Concluding his paper, Mr. Marshall stated that in his opinion, "the grounding of equipment does not entirely remove the danger of shock but when properly installed and maintained it goes a long way toward eliminating the hazard of shock."

Comparing various systems for grounding strip-mining equipment, J. J. Huey, chief engineer, The United Electric Coal Cos., Chicago, said that "it probably never will be possible to protect personnel from the careless handling of high-voltage circuits but it has been recognized that hazards do exist in ordinary schemes of power delivery as used in industry on stationary equipment when these same schemes are simply transferred to open-pit mining operations."

In general, said Mr. Huey, "a three-wire system with simple earth grounding for protection is not a satisfactory way to operate portable equipment . . . We have therefore come to place a large measure of reliance on a metallic ground wire . . . grounded periodically as an added precaution." But even with a ground wire, hazardous conditions can occur before the breaker operates. Consequently, use of a neutral ground resistor to limit the ground current in case of an insulation failure to ground at any point is now recommended.

A number of protective systems were compared by Mr. Huey, who then briefed attempts to develop a satisfactory method of protecting low-voltage distribution systems around strip mines. In discussion following his presentation, he stated that in his opinion nothing really adequate had yet been found, but other schemes are being tried. A simple ground wire, as to a pump, does not, he remarked, offer much protection to a man.

Stating the belief that the possibility of a flash from a trailing cable is the greatest explosion hazard encountered in the majority of mines, W. C. Painter, master mechanic, Independent Coal & Coke Co., Kenilworth, Utah, summarized work to develop a protective means, culminating in the use of a ground shield around the insulated positive conductor and connecting it through a sensitive trip coil of a nip circuit breaker. "The ground shield thus acts as a detector of an incipient fault in the cable insulation. The trip coil carries only the current through the insulation fault and not the total of fault current plus load current."

The breaker cannot be reclosed and consequently the cable and breaker must be removed for repair at the shop. The nip circuit breaker also has an overload trip set at a value well above the operating peak just in case of an unpredictable short. A DP contactor at the cable entrance on the machine remains open until both connections are made at the nip, thus insuring completing of the nega-

tive and positive connections to the rail and to the power.

"The sole objective of a frame-ground protective system must be to eliminate all hazards due to faulting of the insulation of the circuits in the mining machine," said Mr. Painter. "This cannot be effected solely by grounding the frame. The method must comprise a device that will detect an incipient faulting of the insulation and then cut power off the machine instantly. As long as power is cut off, it is immaterial whether or not the frame is grounded."

"Accordingly, we developed the method of connecting the machine frame to the negative conductor through a sensitive manual-reset ground-fault relay, the connection to the negative being made through a Rectox rectifier to the ground shield in the cable. The normally closed contact of this relay is in series with the magnet coil of the Kenilworth contactor. When an incipient faulting of the insulation occurs, the ground-fault relay trips and opens the DP contactor, thus cutting off the power."

### Attracting Young Men to Mining

"To attract more young men to the mining industry, it is essential that the opportunities for more interesting and profitable employment be made clear to them," declared M. D. Cooper, manager of vocational training, National Coal Association. Publicity on the industry's plans and achievements and enlistment of public and educational interest are essential.

Outlining mining courses now offered in public schools, Mr. Cooper urged that the mining industry foster such courses and that it make as many mining scholarships available as possible.

"To provide the solid foundation of wide experience in the operation of mines, the operators could organize training courses that would attract men to the industry." A two-year course has been suggested, based on regular work in various capacities during summer vacations. A possible course, said Mr. Cooper, might be organized into eight periods, as follows: first, work with the engineering staff; second and third, various underground jobs; fourth, machine-shop work; fifth, engineering office; sixth, clerical work; seventh, preparation; eighth, sales.

"Considering the opportunities there are for attracting young men to the mining industry by means of favorable publicity, accurate and up-to-date instruction in high schools and colleges, and well-supervised training courses within the industry, it appears evident that those interested in the future of mining have a splendid opportunity before them," Mr. Cooper concluded. "By actively supporting education at all levels, they may brighten the reputation of the mining industry and cause it to rank

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high among all industries so that young men will be anxious to become a part of it."

Praising apprenticeship training as a means of bringing men into the mines and suggesting its wider use, R. H. Dalrymple, commissioner, mine and safety inspection division, Industrial Commission of Utah, stated that the two main reasons for the shortage of miners are that sons are not following in their dad's footsteps and the fear in the minds of others of the hazards of mining. "Travel education" is another possible reason.

Declaring his belief that a more favorable situation must originate in a better reputation for mining, Mr. Dalrymple said that "a possible solution to the problem" revolves around: (1) better mining conditions and a general favorable reputation, (2) medical facilities, (3) towns with modern conveniences, (4) attractive surroundings, (5) religious, recreational and educational facilities, (6) adequate minimum mining laws, (7) enforcement of mining laws, (8) cooperation between employers and miners to improve conditions in and around mines, (9) vocational training for new workers and old employees desirous of advancing their knowledge. "It may be wise," Mr. Dalrymple concluded, "to give thought to some form of retirement program that would provide a certain amount of security to workers."

Agreeing that the situation is now more favorable than ever for making mining attractive, Walter Hornsby, assistant chief, Kentucky Department of Mines and Minerals, declared that "to make coal mining more attractive as a field of employment, we must show the necessity for coal in our economic life, that it is an indispensable industry, that it is permanent, that it can be made as safe as other industries and that it is not more injurious to health than other industries."

Outlining the work of the Mayo State Vocational School, Paintsville, Ky., Mr. Hornsby also sketched an enlarged program now in process of development at the Mayo school. It will include training as follows: mining mechanical work, including related mathematics, science and drawing and mine installation and operation. The latter, it is proposed, will be given in an actual mine with the every-day conditions and problems normally encountered.

The proposed units for specific training were outlined by Mr. Hornsby as follows: opening mines, drainage, mine gases, explosives and blasting, ventilation, practical mine electricity, mine fires and explosions, apparatus and instruments, first aid and mine rescue, general mining practice, operation of mining machinery, mine-rescue procedure for officials and executives and foremanship.

Training at the college level should be approached with the same vigor as public- and vocational-school train-

ing, Mr. Hornsby emphasized. "To develop an efficient training program," he concluded, "it will be necessary for the people to wake up to the realization that education is for the masses and that the man who toils in the mines should have an opportunity for the training he would seek and desire. The young people who eventually will be the miners of tomorrow should have an opportunity to receive training today, so they can serve themselves and the industry in an intelligent manner."

### Diesel Locomotives Underground

Diesel locomotives for underground use, methods of improving the efficiency of state mining departments and coal mining in Alaska, by C. H. Maize, 20th Pennsylvania Bituminous District inspector, and in the Moselle region of France, by W. R. Cunningham, 7th Pennsylvania Bituminous District inspector, were the subjects of the concluding session.

Citing examples of the use of diesel equipment underground in Europe and in the United States, John H. East Jr., mining engineer, U. S. Bureau of Mines, stated that the Bureau is not opposed and has set up a schedule for testing and granting permissible plates.

"Lack of knowledge of the real hazard of diesel engines and of means for removing the hazard, adverse mining laws because of this lack of knowledge, and absence of information on the successful performance of diesels in European coal mines are probably the principal reasons why diesel locomotives have not been used in American coal mines. Some states have laws and regulations prohibiting the use of internal-combustion engines underground. These laws were intended originally to prohibit the use of gasoline-powered equipment; they were enacted before the diesel engine was developed to its present stage of safety and efficiency."

After analyzing the factors involved in their use, Mr. East declared that "diesel mine locomotives and other diesel-powered equipment can be used in underground mines with reasonable safety if proper precautions are taken. In many instances (probably in most), diesel mine locomotives are believed to be safer in underground coal and non-coal mines than electric-trolley systems, because the hazards introduced by the trolley system are greater and more numerous than those introduced by the diesel engine."

"The diesel mine locomotive has many advantages in underground mines compared with trolley-locomotive systems, not only from a safety standpoint but also in over-all economy. The diesel mine locomotive obviates the necessity of extending trolley lines into new workings, maintaining existing trolley lines, bonding rails, and guarding trolley lines so that persons will not come in contact with the wire; it eliminates the need

for any direct-current electricity in the mine and would remove the hazards that attend its application underground. The diesel mine locomotive is also more flexible than the trolley system. In a new mine the cost will be lower if the haulage system is equipped with diesel locomotives.

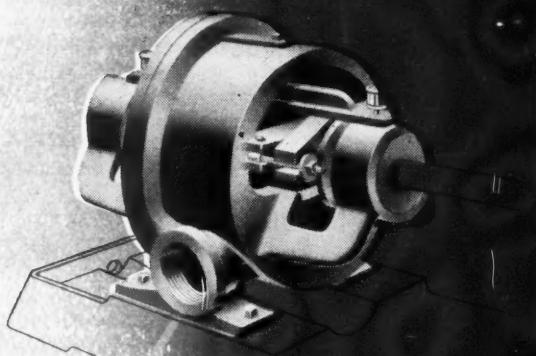
"The principal disadvantages of diesel mine locomotives are that mines using them must be ventilated correctly, as diesel engines require virtually normal air to work efficiently and safely. The correct ventilation of a mine can hardly be classed as a disadvantage, but it is a 'must' requirement."

Detailing experience with a diesel locomotive in his mine from June, 1946, until it was taken out in compliance with the federal safety code, Ronald C. Oliver, general superintendent, Oliver Coal Co., Somerset, Colo., said that his organization first became interested in 1944. As a result of study of the problem, in cooperation with representatives of the Bureau of Mines, a written permit was obtained from the Colorado Coal-Mine Inspection Division to use the yard-type diesel locomotive on hand underground, provided it was operated on the intake not more than 1,200 ft. from the portal and further provided that the Bureau of Mines could check the arrangement any time it desired and the use of the machine would be stopped immediately if any hazard to the workmen developed from its operation.

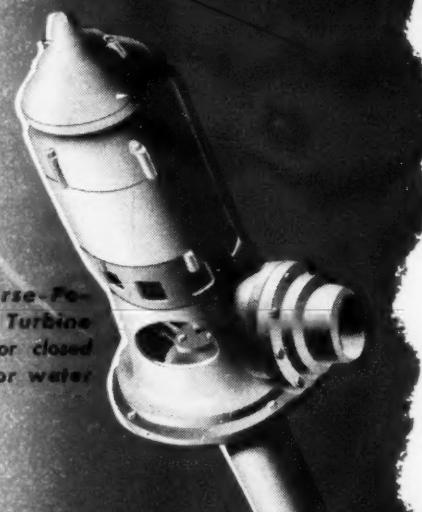
Operation was eminently satisfactory until the use of the locomotive underground was discontinued, Mr. Oliver reported. With the air volume circulated and operation on the intake, no hazard from explosive or toxic gases was experienced at any time.

"Our conclusion at the end of the period during which we operated this locomotive," said Mr. Oliver, "was that diesel power could be quite readily adapted to operate under practically any conditions under which it was safe to operate a trolley locomotive. While we do not claim 100-percent success for a permanent operation with the machine we were using, it is our confirmed opinion that a diesel locomotive of the proper size, equipped with a scrubbing device and operating in a sufficient volume of fresh air, is a more-flexible, more-economical and—most important—much-safer piece of equipment for underground haulage than is the conventional trolley locomotive."

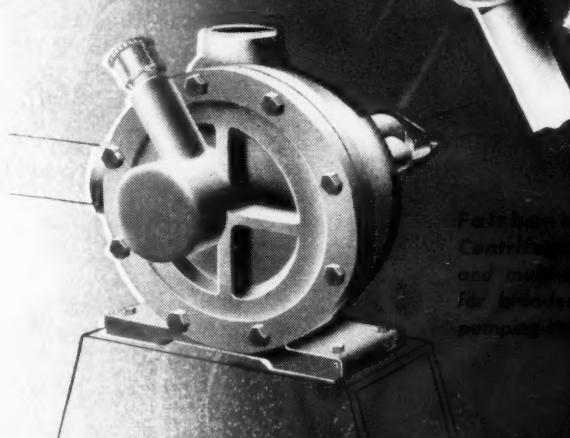
The two principal hazards of diesel use "are practically nil in our operations," said Burr L. Aton, air-hygiene engineer, Eagle-Picher Mining & Smelting Co., Cardin, Okla. Two diesel-powered trucks pulling 10-ton semi-trailers are in operation in one mine. "These two units replaced five 3-ton battery trucks. The fire hazards are at a minimum—no combustible material and no gases. The toxic gases are very easily handled after



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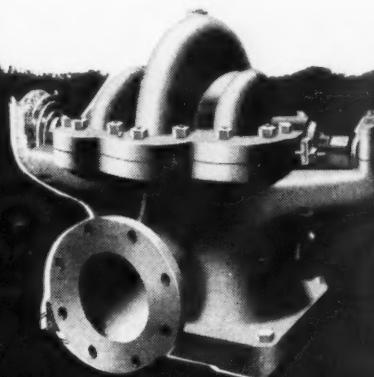
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you get to know them. So we are very pleased with diesel power underground and at the present are completing arrangements to put more diesel equipment underground."

"There is a wide variation in the adequacy of laws and the efficiency of inspection and enforcement in the various states," said R. L. Ireland Jr., president, Hanna Coal Co., Cleveland, in a discussion of methods of improving the efficiency of state mining departments, read by Ford Sampson, labor commissioner, Ohio Coal Association. Continued disasters indicate that something needs to be done. "No one should take a more sincere and realistic view of this matter than the state mining official. It has been suggested that he is so inferior that his work should be turned over to a federal bureau. Just why the federal bureau can be expected to do a better job is not clear. Certainly part of the criticism of state departments is justified.

"It behooves state officials, coal operators and the United Mine Workers to give serious attention to the solution of the problem of improving state mining laws and the efficiency of state mining departments. Certainly none of us want to see the work of the state departments taken over by the U. S. Bureau of Mines, nor do we want to see the waste and confusion created by two duplicate agencies supposedly doing the same work."

Suggestions for improvement offered by Mr. Ireland, in the order of importance to him, are summarized as follows:

1. Tightening up of enforcement of existing laws.
2. Selection of mining-department heads on the basis of experience and ability.
3. Removal of mining departments from politics.
4. Adequate salaries for mining-department staffs.
5. Good follow-up on inspection reports to see that orders are carried out.
6. Revision of state mining laws as necessary to eliminate outstanding defects and secure proper attention to such matters as ventilation, reporting by inspectors on vital matters and reporting by operators on compliance. All unnecessary material should be removed from the mining laws.
7. Adequate laboratory facilities.
8. Cooperation by operators with inspectors.
9. Assumption of equal responsibility by the mine workers.
10. Formation of safety committees by coal operators.

Discussion following Mr. Ireland's paper brought out the fact that state officials fear further federal encroachment and see in it further loss of rights to government. Action with Congress, backed up by action to make state laws and inspection practices more uniform, was urged to reverse the trend. "It is time," one chief put it, "to do something."

## Gas Industry Pushes Billion-Dollar Plans

Gas-utility industries are prepared to spend a billion dollars in expanding production, transmission and distribution facilities to meet expanding demands, according to a survey released by the American Gas Association at the end of May. Shortages of steel, pipe and tin plate are hampering the industry's growth, it was pointed out, but production capacity is being increased steadily and new discoveries are far exceeding consumption. "There is no shortage of gas," the survey contended, but the shortages exist "in materials required to transmit and distribute gas to prospective customers."

Citing some of the industry's most ambitious projects, the A.G.A. listed the following:

Tennessee Gas & Transmission Co.—A 1,000-mile line from Houston to West Virginia.

El Paso Natural Gas Co., Southern California Gas Co. and Southern Counties Gas Co.—A 1,280-mile line from Texas to California at a cost of \$70,000,000.

Michigan Consolidated Gas Co. and subsidiaries—Expenditure of \$1,500,000 in gas-field facilities preparatory to construction of the \$52,000,000 Michigan-Wisconsin pipeline.

Amarillo Oil Co. and affiliates—Compression facilities and additional loop lines, including a new 16-in. line.

Penn-York Natural Gas Corp. and Dominion Natural Gas Co., Ltd.—A 10-in line stretching 122 miles from the Appalachian area.

Meanwhile, the Federal Power Commission scheduled hearings on old and new applications for new lines and increased facilities. Applications of two natural-gas companies were ordered heard in consolidated FPC sessions in Chattanooga, Tenn., beginning May 26. The companies concerned and their applications are as follows:

The Southern Natural Gas Co.—Application for authorization of a 1947-48 program including additional capacity of 201,000,000 cubic feet daily and more than 140 miles of pipeline to serve the Montgomery-Columbus line, Gadsden, Ala., and Chattanooga. Southern has asked for an emergency certificate.

The East Tennessee Natural Gas Co.—Applications for permission to construct a 16-in. line into Chattanooga and Knoxville to serve these two cities and 40 other communities.

The application of the Alabama-Tennessee Natural Gas Co. for authority to build 66 miles of 10 1/4-in. pipeline for delivery of gas for resale at Florence, Sheffield and Muscle Shoals, originally consolidated with the requests of East Tennessee and Southern, above, was postponed indefinitely pending major changes in the project.

Likewise, FPC consolidated hearings on three applications of the

Northern Natural Gas Co. and set June 16 as the date for hearing the first witnesses in Washington, D. C. These applications include requests for permission to enlarge capacity, to sell gas as boiler fuel to the Iowa Electric Light & Power Co. at Boone, Iowa, and to construct new mileage in Iowa.

Hearings on the application of the Trans-Continental Gas Pipe Line Co., Inc., for 1,380 miles of 26-in. pipeline from Texas to the eastern seaboard, including New York, New Jersey, Pennsylvania and Delaware, were set for June 9 in Washington. This corporation originally was organized to purchase and operate the Big and Little Inch lines, but after its failure to bid successfully it amended its application in an effort to build a new system. Capacity of the proposed lines would be 325,000,000 cu. ft. daily.

Hearings have been scheduled for July 7 in Washington on the application of the Texas Eastern Transmission Corp. for a permanent certificate of public convenience and necessity authorizing operation of the Big and Little Inch lines and construction of additional facilities at a cost of \$38,980,000 to insure capacity of 425,000,000 cu. ft. daily. The company now is operating under a temporary certificate.

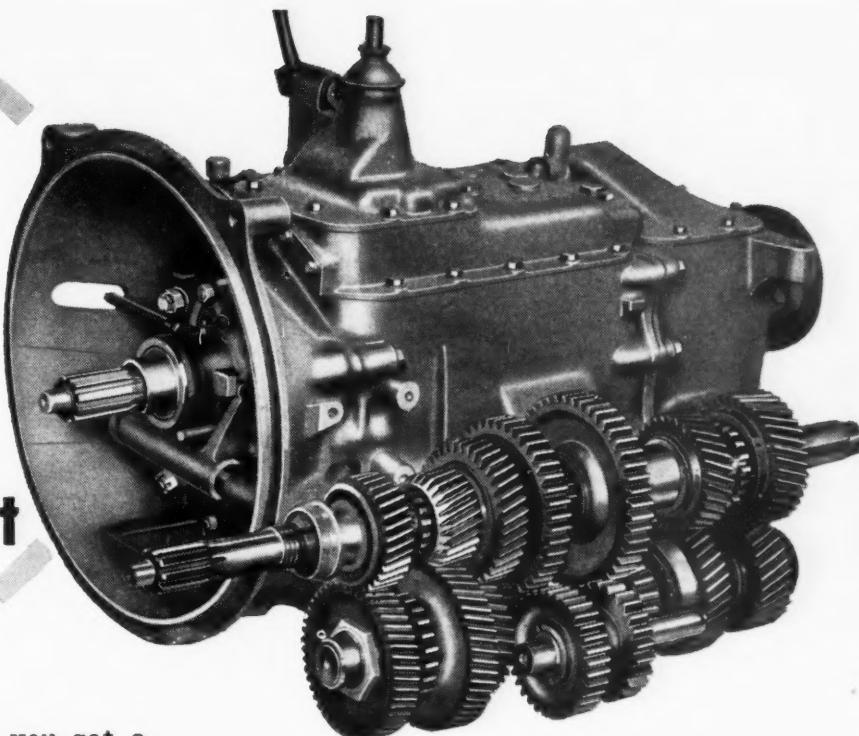
The Cities Service Gas Co. has asked for authority to build 75 miles of additional pipelines at the Oklahoma end of its system to boost capacity to 648,000,000 cu. ft. daily. Permission was granted in mid-June on this company's application for construction of 405 miles of pipeline from the Hugoton field to Kansas City. These latter facilities, when completed prior to the 1948-49 heating season, will increase the system's capacity to 360,000,000 cu. ft. daily.

Earlier in June, FPC authorized the New York State Natural Gas Corp. to build facilities enabling it to receive 75,000,000 cu. ft. per day from the Big and Little Inch lines through a connection in Green County, Pa.

## Seek to Restore Funds For Anthracite Lab

Restoration of a \$450,000 item in the appropriation bill for the Department of the Interior for construction of an anthracite laboratory was asked by Dr. R. R. Sayers, director, U. S. Bureau of Mines, in hearings before a Senate appropriations subcommittee May 27. Funds for the laboratory had been struck out of the House bill when disagreement developed over the site. Establishment of the laboratory was authorized by Congress in 1942 and a survey for a site was started in 1946. In Jan., 1947, a three-man advisory committee recommended a location at Hazleton.

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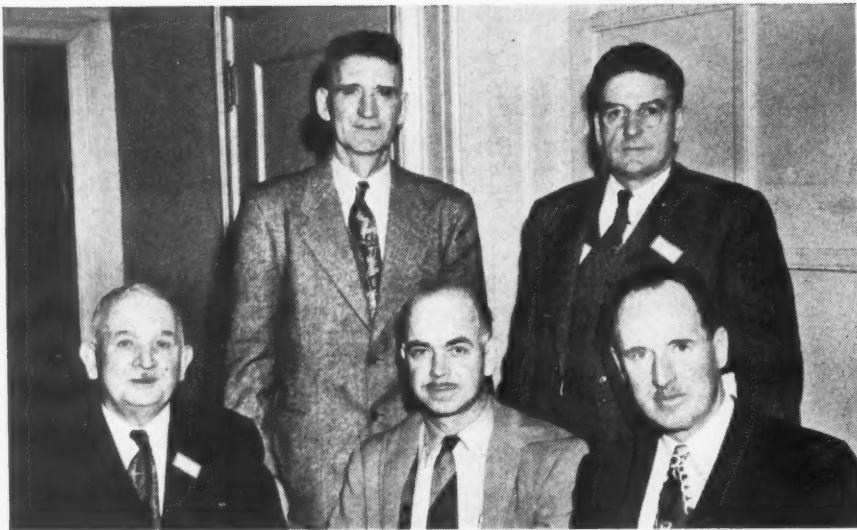
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Mack Model LMSW-M is engineered specifically for heavy-duty, off-highway service. As a dumper, it hauls big yardage per load with maximum trips per hour—the formula that transforms ore, rock, coal or earth into real pay dirt. This diesel-powered unit, with 15-ton side-dumping body, is one of three working for Lone Star Cement Co. at its limestone quarries in Greencastle, Ind.



Part of the new official roster—John Sidle (seated, left), Clayton Coal Co.; Ronald C. Oliver, general superintendent, Oliver Coal Co., new president; Walter F. Clarke, Independent Coal and Coke Co.; Fritz W. Koelling (standing, left), Phelps Dodge Co.; and S. C. Harvey, Calumet Fuel Co.



B. P. Manley (left), secretary, Utah Coal Operators' Association and general meeting chairman; Walter F. Clarke, general manager, Independent Coal & Coke Co., and program chairman; Fred W. Whiteside; secretary-treasurer; and Sam Fratto, safety engineer, Independent Coal & Coke Co.

## Ways to Promote Coal-Mining Progress Theme of Rocky Mountain Meeting

Coal production, preparation, safety and utilization, with an excursion to Japan, were the themes of the 43rd regular meeting of the Rocky Mountain Coal Mining Institute, held at the Hotel Utah, Salt Lake City, Utah, May 26-28, with B. P. Manley, secretary, Utah Coal Operators' Association, as general chairman, and Walter F. Clarke, general manager, Independent Coal & Coke, as chairman of the program committee. Ronald C. Oliver, president, Oliver Coal Co., Somerset, Colo., was elected president at the business session, at which resolutions were adopted advocating provision of sufficient funds by Congress for expansion of coal research in the

western states and for doing the necessary statistical work on coal.

The need for safety training of foremen and other employees, said Sam Fratto, safety engineer, Independent Coal & Coke Co., Kenilworth, Utah, results from five major circumstances: (1) lack of well-trained foremen, (2) new mining methods with new hazards, (3) new types of machinery, (4) inexperienced labor and (5) new restrictions on mining practices (safety code). Mr. Manley presided.

Training of new foremen was started by the Independent Coal & Coke Co. in 1938 and since 1942, Mr. Fratto reported, he, himself had

trained 135 foremen and 65 firebosses. In prewar days, experienced men were frequent. "Now, there are no experienced foremen, firebosses or miners looking for work." Consequently, "it is now necessary to bring inexperienced workers into the mine and train them to work safely and efficiently with the new mining equipment that is being added constantly."

In view of the several factors cited, training now is a necessity, Mr. Fratto declared. In the case of employees, it should include first-aid training, education in the code, law and company rules and regular management-employee meetings. Meetings with new employees before they go to work are particularly important.

The "Western Coal-Mine Course," given by the Independent Coal & Coke Co. for the past eight years to prospective supervisors, who must have had at least three years' experience and are carefully picked, was outlined by Mr. Fratto as follows:

"1. Mine-rescue and first-aid training, 30 hours. Particular stress is given to this as we believe every supervisor or boss must be trained in first aid and mine rescue, since in an emergency the workmen look to these men for instructions.

"2. Coal-mine gases and protection against gases, six hours.

"3. Coal-mine ventilation and efficiency, 10 hours.

"4. The construction and use of gas-detecting devices—flame safety lamps, methane detectors, four hours.

"5. Coal-mine timbering, systematic timbering and the reduction of accidents by systematic timbering, six hours.

"6. Discussion and interpretation of the coal-mine safety orders and the Federal Coal-Mine Safety Code, six hours.

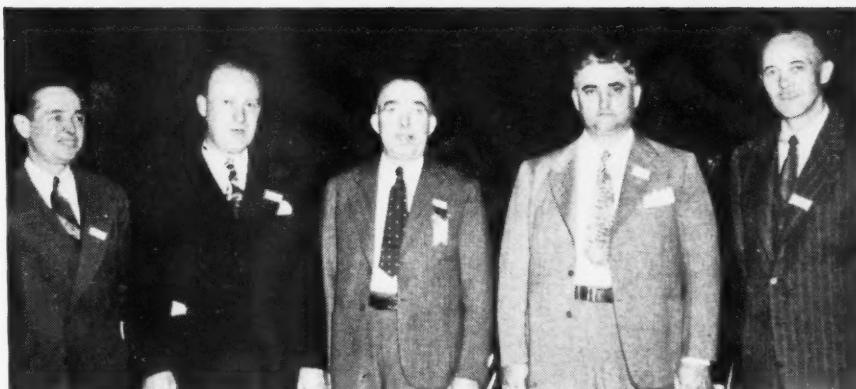
"7. The safe use of electricity in gaseous mines, five hours.

"8. Coal-mine layout and planning, four hours.

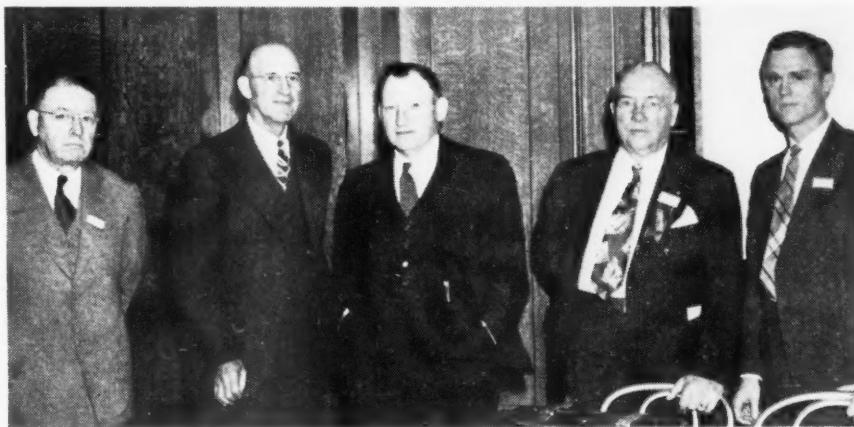
"9. Handling of men and safety training, four hours."

Training is taken by the men on their own time, Mr. Fratto stated in response to a question, and they are not paid for the time they spend—so far, with the full accord of the union.

Conversion of coal to liquid fuels will bring western coal producers considerable extra tonnage in the future, declared V. F. Parry, U. S. Bureau of Mines, in discussing trends in energy production and use at the afternoon session May 26, with John Emrick, Sullivan Machinery Co., and L. E. Adams, president, Spring Canyon Coal Co., presiding as co-chairmen. By 1975, said Mr. Parry, population in the eleven western states, statistics indicate, will be 22,000,000. Energy required will be 6,000 trillion British thermal units, equivalent to about 250,000,000 tons of coal. By 1975, estimating conservatively, the West should be producing 90,000,000 tons of coal to meet the needs of the



J. A. Setter (left), General Electric Co.; D. F. McElhattan, Mine Safety Appliances Co.; John Emrick, Sullivan Machinery Co.; R. G. Gehlsen, Mines Equipment Co.; and V. F. Parry, U. S. Bureau of Mines.



John Griffen, McNally-Pittsburg Mfg. Corp.; Ernest Klopetko, Combined Metals Reduction Co.; William A. Fealy, Bethlehem Steel Co.; Fred W. Whiteside, Institute secretary-treasurer; and R. G. Heers, Kaiser Co., Inc.

expected population, against about 27,000,000 tons in 1950.

The increase to be expected in coal production by 1975 will result primarily from conversion of coal to oil to offset the declining oil percentage, Mr. Parry felt. Coal for present normal uses, however, will remain approximately the same, or about 13 percent of the total energy used in the eleven western states.

Because coal, it is expected, must supply energy demands which oil will have to drop in the future, conversion is a major item in research at the Bureau of Mines station at Golden, Colo., Mr. Parry stated. Storage also will be a problem and the station is studying and has a promising answer to storing the low-rank coals of the west. Drying of lignite is another problem. Drying with steam in an autoclave is felt to hold promise in the case of sized coal but apparently is not the answer with slack. Consequently, the station is trying a new high-speed unit employing heated inert gases for drying slack.

In converting coal to liquid fuels, said Mr. Parry, a major problem is a supply of hydrogen. Consequently, investigations include processing of sub-bituminous coal and lignite for that purpose. Progress, he felt, is being made.

The fact that rules for grounding

of electrical equipment are general rather than specific and are open to a number of interpretations has led to confusion, said R. G. Gehlsen, Mines Equipment Co. In grounding, however, it must be remembered that every ampere sent out by a power source must eventually return to that same source. "This strikes at the heart of the theory of grounding. Much labor and material is spent to secure a low resistance contact with the earth with the thought in mind that the earth is a dumping place for electricity and that by the very fact that a 'ground' is established the power will be dissipated into regions beyond. This is not so. Every ampere that flows into the earth has to come back out again and find its way to the return terminal of the generator that sent it out."

Earth, it has been established, is a poor conductor of electricity and varies in character and, consequently, in conductivity. Since every unit of electricity that goes into it must come out again, the stage is set for an examination of the grounding problem. Developing the subject of grounding by diagrams, Mr. Gehlsen demonstrated that attaching a ground wire to the machine frame is not the complete answer.

"A safety ground wire," Mr. Gehlsen continued, "should be attached to

the machine frame and run through the same cable with the power conductors, through a safety ground trip in the switchgear protecting the piece of machinery involved and then to a point of contact with the earth, which in turn has a solid metallic connection with the power source. A safety ground trip is an auxiliary of an automatic circuit breaker designed for this particular kind of service. Its current rating can be 2, 5 or 10 amp., as desired.

"This safety ground trip is wired in series with the safety ground wire and functions as a watch dog to limit the fault current, so that electrical machinery is not destroyed by the power that flows in an insulation fault because the trip-coil rating is of such low value. It therefore limits the large damaging current that flows during insulation failure to a relatively harmless value and at the same time limits the voltage that may appear on a machine frame to several volts, which is a long way from being injurious to personnel. In this, lies the answer to the problem of grounding—an answer that should meet the requirements of both operators and inspectors."

Charting methods of using the ground trip with both d.c. and a.c., including the "derived neutral" for delta-connected transformers, Mr. Gehlsen stated that much time has been devoted to development of new products to meet grounding requirements. "The results should be such that face equipment is properly grounded through safety ground trips. The manner in which this is economically accomplished can be through suitable assemblies of cable and connectors that are polarized and automatically carry the ground wire, in conjunction with portable safety circuit centers specifically designed to provide individual protection to a specific machine. Thus, our various aims are realized, in that power is transmitted quickly and economically and all machine frames shall be held to a potential not injurious to personnel. This means, simply, a coordinated system of power distribution in which the proper grounding of face equipment is realized."

Dynamic braking applied to slope hoists was recounted by Joseph A. Setter, General Electric Co. This article, originally prepared for *Coal Age*, appears on p. 98 of this issue.

Showing a color film of a coal-dust explosion demonstration at the experimental mine of the U. S. Bureau of Mines, Bruceton, Pa., D. F. McElhattan, Mine Safety Appliances Co., stressed the need for adequate rock dusting.

The two general functions of preparation are adjusting the physical characteristics and improving the chemical characteristics, said John Griffen, McNally-Pittsburg Mfg. Corp., in opening the morning session May 27, with R. G. Heers, Kaiser Co., Inc., as chairman. Size adjustment is



Charles L. Waggoner (left), Geneva Steel Co.; Kirk V. Cammack, U. S. Geological Survey; Dr. Harold J. Rose, Bituminous Coal Research, Inc., and D. H. Pape, Sheridan-Wyoming Coal Co., Inc.



W. T. Ferguson (left), Goodman Mfg. Co.; A. P. Cederlof, Peerless Sales Co.; and C. E. McWhorter, Goodman Mfg. Co.

necessary to meet the requirements of the burning equipment and to make coal easier and more convenient to use. Improving the chemical characteristics, including impurity removal and drying, increases the heat content of the coal and enables it to do a more efficient and economical job for the user.

The economic situation, including competitive pressure, are among the influences forcing increased use of machines in coal preparation, along with the fact that preparation is becoming a more varied and complicated task. If the trend of market requirements can be accurately forecast, said Mr. Griffen, all factors can be taken care of in the original plant design, saving increased capital expenditures later on. Freight rates are an important factor in coal marketing, and good preparation, by enhancing the value of the coal, can offset to some extent their effect—a matter of particular interest in the West, where higher freight rates are the rule.

The advantages of mechanical coal preparation, said Mr. Griffen, were set out by J. B. Morrow in an institute paper 17 years earlier. They are: (1) lower cost, (2) better average quality and greater uniformity and (3) an almost complete absence of

pure coal in the refuse. Mechanical loading, Mr. Griffen pointed out, has increased the refuse content of mine run and thus has required greater use of machines in preparation. The demand for lump is on the wane in the East, which brings up the question of designing crushing facilities to keep the slack production down and the yield of prepared sizes as high as possible.

Sprinkling underground has affected the use of air cleaning, said Mr. Griffen. Where washing is done, a supply of water and reduction of stream pollution is a problem. Equipment and methods have been worked out, however, to keep the quantity necessary to as low as 2½ percent of the raw-coal weight or less. With mechanical cleaning, a steady feed is necessary, which is met by proper mine-car capacity, surge bins and proper design of plant facilities. Where metallurgical coal is the goal, blending bins are being increasingly employed to assure greater uniformity in the characteristics of the product.

Increased washing means increased drying. With modern screens, rather low moisture figures are now possible, said Mr. Griffen. To get lower moisture content, equipment includes centrifugal dryers, thickeners and

vacuum filters, plus, in many cases, heat drying. The development of the screen-type heat dryer now makes possible a material reduction in capital and operating costs. The flash dryer now offers even greater possibilities.

Development of a process and plant for the production of refined resins from Utah coals was detailed by Ernest Klopetko, Combined Metals Reduction Co. Utah coals contain considerable resin, although the content varies from location to location. In certain areas, however, it runs 4 to 6 percent, occurring in deposits up to  $\frac{1}{8}$  to  $\frac{1}{4}$  in. thick along the fracture planes. It is recovered by crushing the coal to minus  $\frac{3}{8}$  in., then putting the minus 6-mesh fraction, which contains almost all the resin, through a flotation plant. The concentrate recovered is then refined to produce the final product, which is used in dielectric varnishes, printing inks, cements, the processing of synthetic and natural rubber and so on.

In one case, processing 180 tons of minus 6-mesh coal derived from 275 tons of minus  $\frac{3}{8}$  in. yielded 22,359 lb. of dry resin concentrate running about 70 percent resin. By keeping the size of the coal as large as possible, no difficulty has been encountered in selling it. Removal of the resin, said Mr. Klopetko, actually increases the heat content, since resin runs about 8,000 B.t.u., compared to 13,000 B.t.u. for a good Utah coal. Recovery of the resin also eliminates the slimy coal-bone and slate fraction.

Prefabricated track, said William A. Fealy, Bethlehem Steel Co., offers advantages through (1) labor savings and (2) better haulage and higher production efficiency. Putting the labor into track design and fabrication before laying results in higher efficiency and lower cost.

Features which prefabricated track provide include: (1) self-contained joints, (2) pre-bent and pre-curved rails, (3) steel or composite ties heavy enough for the duty, (4) special turnout ties and (5), where mining methods permit, a development designed for high production.

Heavy loads and higher speeds require precision track. Prefabrication reduces the size of tracklaying forces and delays in transportation. Two trackmen, said Mr. Fealy, can do the work as compared to four. Some track has been removed and re-installed seven times to date.

Good transportation also is facilitated by mine cars designed for the job, wheels that are lighter and cannot be broken and high-strength light-weight corrosion-resisting steel for cars. Forged-steel wheels, said Mr. Fealy, are lighter and, in addition to other advantages, such as ease in rebuilding to original size and condition, none have broken in service up to seven years or more. From the service and maintenance standpoints, larger wheels are better. Forged-steel wheels also lend themselves to



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service where it is designed to eliminate braking. Light, high-strength steels reduce mine-car weight 18 to 20 percent and their resistance to corrosion lengthens car life.

Mining in Japan takes place in 57 relatively small coal fields on the three main islands, said Kirk V. Cammack, U. S. Geological Service, who did a tour of duty in the country on assignment with the National Resources Section under the Supreme Commander of the Allied Powers. Walter F. Clarke, Independent Coal & Coke Co., and L. R. Weber, Liberty Fuel Co., acted as co-chairmen for this afternoon session May 27. The coal beds, said Mr. Cammack, vary from lignites to high-volatile steam and coking coals, with some anthracite. Mineral rights are owned by the government and a relatively small number of companies exercise a virtual production monopoly and operate the mines under a system of cost plus government subsidies.

Individual colliery operations are very extensive, wet washing is employed and all operations have been made as self-sustaining as possible by adding small manufacturing plants. From 12,000 to 15,000 men are employed at one large colliery.

A number of workable beds occur at fairly close intervals in each field, said Mr. Cammack. Access to these beds is through rock slopes supplemented by shafts. All coal extraction is by long-face methods and is accomplished by backfilling to prevent subsidence. Partial packing by hand stowage is generally practiced, although hydraulic and pneumatic stowage systems are in use.

Extensive endless and gravity-plane rope systems are used in haulage, supplemented by belt conveyors on the main slopes. Hand loading at the faces is universal, the coal usually being loaded onto chain or belt conveyors which discharge into pit cars. Use of cutting machines and explosives in face preparation is limited, the coal being freed from the face by the use of pneumatic picks or hand mining.

Masonry and steel-arched timbering is used extensively in development work, the steel having been secured largely in the United States as scrap prior to the embargo on such material. Two of the major fields extend beneath the floor of the ocean, and drainage is a serious problem in many of the mines. Eighty tons of water is pumped per ton of coal mined in one mine in the Joban field.

All the mines are gaseous. Ventilation is by exhaust centrifugal fans. Direction of the ventilating currents underground is poor, and explosions originating in gas ignitions are frequent. These explosions are accompanied by a very high loss of life. Excessive earth temperatures occur in the mines of some of the fields, temperatures of 100 deg. F. being recorded at some working faces. Two mine experimental sta-

## Rocky Mountain Officers

Ronald C. Oliver, president, Oliver Coal Co., Somerset, Colo., was elected president of the Rocky Mountain Coal Mining Institute at the Salt Lake City meeting. He succeeds Paul L. Shields, vice president and general manager, United States Fuel Co., Salt Lake City.

Fred W. Whiteside, Denver, Colo., was re-elected secretary-treasurer. Other officers were elected as follows:

Vice presidents—Colorado, John T. Sidle, Clayton Coal Co.; New Mexico, F. W. Koelling, Stag Canon Branch, Phelps Dodge Co.; Utah, Walter F. Clarke, Independent Coal & Coke Co.; Wyoming, John Lucas, Rock Springs Fuel Co.; special representative for Montana, S. H. Clarke, Roundup Coal Mining Co.

Members of the executive board—Colorado, Stanley C. Harvey, Calumet Fuel Co., and R. M. Magraw; New Mexico, Oscar Huber, Albuquerque & Cerrillos Coal Co., and G. O. Arnold, Stag Canon Branch, Phelps Dodge Co.; Utah, A. B. Foulger, Lion Coal Corp., and C. Arthur Carlson, Spring Canyon, Royal and Standard Coal Companies; Wyoming, Ben Cook, Union Pacific Coal Co., and N. A. Swenson, Nugget Coal Co.

tions and a system of governmental inspections, modeled after our state inspection systems, are in operation but are inefficient and ineffective. Both frequency and fatality rates per ton of coal produced are approximately 20 times greater than in the United States.

Employment systems at the collieries are largely feudalistic. The living and working conditions of the Japanese miner are probably the worst in the world. In the war years, employment of prisoners of war and women was universal in all the coal fields. These practices were terminated by the Supreme Commander for the Allied Powers immediately after the occupation.

Comparisons of mining costs and wages are difficult to make but, in purchasing power of the goods available to him, the present earnings of the Japanese miner are equivalent to a daily wage of 25c. in the United States. Labor costs constitute about 30 percent of the total production cost. Calculated on an exchange value for goods used, total production costs are comparable to some of the older hand-loading mines of the United States.

Malnutrition and disease are prevalent among the Japanese miners, Mr. Cammack stated. A current unrest exists against their employers and their conditions of employment. Reaction to American occupation by

the Japanese miner and the immediate supervisory officials at the collieries has been very good.

In operating the Geneva steel plant at Provo, Utah, said Charles L. Waggoner, Geneva Steel Co., practically the materials necessary have been found in the same area. Blending of limestone and iron ore has been very helpful in getting results. In coking coal, however, the choice, said Mr. Waggoner, was one out of one. In other words, although the western states have large coal reserves, coal for metallurgical coke is limited. Geneva therefore must depend for the present on a high-oxygen young-rank coal with borderline coking properties.

Better coke from the Geneva mine in the Sunnyside seam of Utah is obtained as the thickness of the cover increases. In 1944, some 4,651 lb. of coal was required per net ton of pig iron. Extensive tests were undertaken to improve the situation. These uncovered the fact that as coal density increases better coke results. Thus, it appeared that reducing the voids in the coal charged and at the same time supplying the deficiency in coking ability would be steps in the right direction. Higher oven temperatures also held out a promise of better results. Consequently, three steps were taken simultaneously: (1) raising oven temperature, (2) changing pulverizing practice and (3) adding 4 percent coal-tar pitch.

As a result of these changes, said Mr. Waggoner, a net ton of pig iron can be produced with 2,900 lb. of coal. For the future, discovery of some other coal or material should make for even better results and such other coals and materials are being studied.

The constantly increasing trend toward more research is a bright spot in the coal picture, declared Harold J. Rose, Bituminous Coal Research, Inc. Liquid fuels from coal are looming larger because of the relatively low reserves of oil and natural gas, high demand and the need for keeping the country self-sufficient in liquid fuels. The rate of oil discovery is lagging and no competent authority believes the demand for liquid fuels can be met in the future by petroleum. While coal still faces tough competition, petroleum production will decline and the price will increase, thus stimulating the development of synthetic liquid fuels from coal.

If oil, in addition to present business, took over all coal markets, the supply would last only 4½ years. In the case of natural gas, the period is 6½ years. Therefore, said Dr. Rose, it is difficult to see how oil or natural gas can take over the coal market. If coal took over the oil and gas markets, the present coal reserves would last 2,085 years. Since over half the reserves are in the western states and since the characteristics of western coals are assets in conversion, that area should benefit markedly in the future for these reasons as well as



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Labor-relations panel—Thomas Bendall (left), Utah Fuel Co., Fritz Koelling, Stag Canon Branch, Phelps Dodge Co.; Dennis Zubak, Independent Coal & Coke Co.; W. R. Spence, The Union Pacific Coal Co.; and Otto Herres, Combined Metals Reduction Co., moderator.

for the growth in population and industry.

Discussing the coal-fired gas-turbine locomotive, Dr. Rose said progress has been extremely rapid and that it is expected that two 4,000-hp. units will be on the rails within a year. The goal is a locomotive that will run 1,000 miles at 100 m.p.h. without stops, that will use a wide variety of coals, that will be dependable and that can be used continuously. The locomotives will have greater power in winter, will require no water and will be smokeless and cinderless, as well as being greatly cheaper to operate.

In connection with present steam locomotives, Dr. Rose reported that research is going on in air supply, drafting and efficient combustion, in better coal handling and elimination of segregation and in front-end cinder collection and return to the fire.

Overfire air jets, he stated, are a big answer to the smoke problem and are being increasingly used to eliminate smoke from locomotives and stationary plants. Not yet commercially feasible, they may prove effective in the future on home-heating plants. However, BCR also is attacking the problem by developing smokeless stoves and other heating equipment. In the field of mining, Dr. Rose stated, BCR is expanding its program to go into the development of mining methods and machines to produce coal at much lower cost from seams 28 in. and up in thickness.

Recalling that the duckbill was born in the West, W. T. Ferguson, Goodman Mfg. Co., pointed out that it now has been developed from a simple self-loading conveyor into a simple but maneuverable positive-action loading machine with a rear conveyor as long as the room is deep. George B. Pryde, retired president of the Union Pacific Coal Co., presided at the May 28 session and recited

some of the human-interest highlights in the design of the first duckbill in the shops of his company.

The new duckbill, said Mr. Ferguson, consists of three major parts: (1) the duckbill proper, (2) a swivel permitting a lateral swing through 90 deg. with full maintenance of motion and limit switches to prevent overswinging and (3) a hoist mechanism, including high-torque motor and control, which powers the lateral swing and pulls the duckbill forward for the next cut. Two types are now available, one 31 in. high and the other 21.

Because seam thickness is declining in that area and because labor productively decreases with seam height, the demand for cost reduction so far has channeled power duckbills largely into the East. Outlining the cycle of operation in a typical mine, Mr. Ferguson emphasized the need for a well-planned cycle and the benefits time studies afford. Answering questions, Mr. Ferguson passed on operator statements that the performance of the standard and power duckbills is in the ratio of 82 to 135 in one case. In another case, where coal thickness is 32 in., the standard duckbill increased performance 61 percent and the power duckbill resulted in a further increase of 22 percent. In one mine operating in 44-in. coal, output on one day when a time study was made was 180 tons with a crew of six men.

Mining-and-loading machines are the next logical step in coal production, declared Ivan A. Given, *Coal Age*, in a summary of progress in mechanical mining, including the extension of power to operations formerly done by hand. His discussion of mining-and-loading machines appeared in the June issue of *Coal Age*, starting on p. 89.

A panel discussion of labor relations in coal mining concluded the

technical sessions. Otto Herres, Combined Metals Reduction Co., acted as moderator and panel members were: Thomas Bendall, Utah Fuel Co.; F. W. Koelling, Stag Canon Branch, Phelps Dodge Corp., New Mexico; Dennis Zubak, Independent Coal & Coke Co., Utah; and W. R. Spence, Union Pacific Coal Co., Wyoming.

Coal miners, the panel agreed, are tired of strikes. However, as one panel member put it, strikes are their only means of making their ideas felt. If an alternate means of expressing their ideas is provided, he felt, the miner would largely abandon the strike weapon. They desire more cooperation with management for the good of all. The question of whether present legislation will weaken the union found one member reporting his men to feel it would. Others expressed the opinion that would not. Workers in western mines, the panel agreed, would like to see state or regional agreements because they feel such agreements would result in better conditions for them.

The question of the spread between high and low wage classifications brought considerable discussion and agreement that the present differential was disadvantageous. Men in the lower brackets envy those in the higher and there is a constant struggle to move up. The panel, in fact, felt that men in the lower ranges were discriminated against from the viewpoint of skill, since operating a machine requires less training, experience and skill than tracklaying, timbering and so on. One result of the present spread is great difficulty in finding and keeping timbermen, tracklayers and other men with the desired skills.

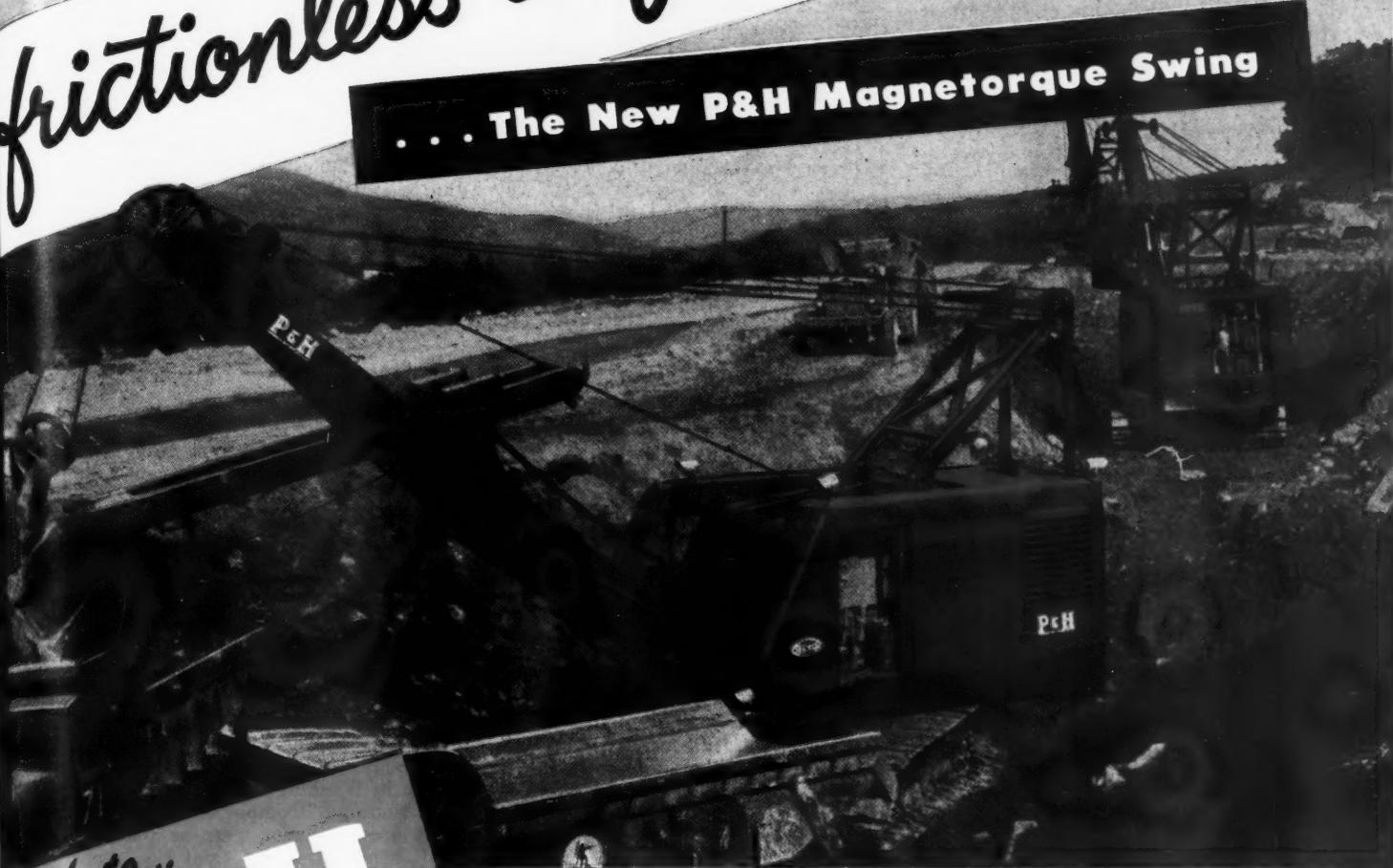
The panel was in agreement that there is no communist activity in the union in the West although some dissatisfaction exists, partly as a result of the spread between high and low wage rates. On the question of the effect of increased wages, costs and prices, panel members expressed opinions that men can see the effects, that they know wage increases result in price rises and that many miners think the government must step in to keep down the cost of living.

Discussing what the union can do to promote safety, certain panel members said that local safety committees are making a real contribution. One member declared that federal inspection and more state activity has definitely improved conditions. In his opinion, it is the supervisors' job to make the miner conform with law and regulations.

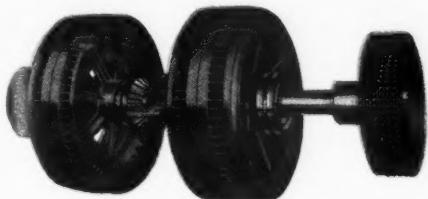
To get better miners, the panel agreed that reduction of the wage spread and good homes and recreational facilities would help materially. Management also has a job, it was brought out, in enlisting the cooperation of miners. It also has the job of stimulating leadership rather than force in supervision, and should train supervisors in that direction.

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## Legislative Efforts On Stripping Continue

Strip-mine operators in Ohio and Pennsylvania faced new battles over pending legislation as state legislatures approached the end of their annual sessions.

In Ohio, the House of Representatives passed and sent to the Senate a bill, endorsed by Governor Thomas J. Herbert and a nine-man commission set up by the preceding legislature, which provides for (1) a \$50 license for persons stripping more than 250 tons annually, (2) a bond of \$200 per acre, with a minimum of \$1,000, to insure compliance with regulations governing restoration of the land, (3) covering the exposed face of unmined coal with 3 ft. of overburden and burial of all roof coal and pyritic shales, (4) sealing off of any breakthroughs to underground diggings, (5) knocking off spoil banks to a cross-section of 15 ft. flat top, (6) building of access roads and fire lanes and (7) planting of trees, shrubs or grasses within a year after termination of operations at a cost not to exceed \$100 per acre. The Ohio Senate conservation committee, who will consider the bill next, postponed further consideration of an almost similar bill on May 15. The proposal now under consideration applies only to coal strip mining.

In Pennsylvania, a bill to place anthracite stripping under state regulation was approved by the House Mines and Mining Committee and was placed on the calendar for consideration before the scheduled adjournment of the legislature in mid-June. The bill, which has the backing of Gov. James H. Duff, would require anthracite stripping operators to obtain state permits, post bonds of \$200 per acre to guarantee backfilling and planting requirements, keep backfilling slopes below 40 deg., cover the face of coal within 5 ft. of the fill and level and plant spoil banks if required by the State Department of Mines.

Elsewhere, in Daviess County, Indiana, 60 Bogard Township farmers petitioned the county auditor for a reassessment of the land owned by mining operators and the State Board of Tax Commissioners promised an early hearing.

## Mines Bureau Awards Safety Trophies

"Sentinels of Safety" trophies for outstanding safety accomplishments in 1946 were awarded May 26 to mining mineral operations in each of six classifications, that had the best accident records in the 22nd annual National Safety Competition sponsored by the U. S. Bureau of Mines, according to Dr. R. R. Sayers, director of the Bureau.

A total of 90 mines and quarries also were awarded Certificates of

Honorable Mention for working 30,000 or more man-hours without an accident or for ranking in the next four places after the winner in each of the six classifications of mines.

With the largest enrollment in the history of the contests, 1946 competition was keen, Dr. Sayers reported. Four hundred and ninety-four mines and quarries in 37 States participated, vying for bronze trophies which are donated by *The Explosives Engineer*. The competition was inaugurated in 1925 to promote safety in the mines and quarries of the Nation.

Winners among underground bituminous-coal mines was the Bankhead No. 2 mine, Consolidated Coal Co., Bankhead, Walker County, Ala., which worked 79,737 man-hours in 1946 without a lost-time accident.

Among underground anthracite mines, the Butler mine, Jermyn-Green Coal Co., Pittston, won top place. Employees worked 267,708 man-hours, with 8 lost-time accidents causing 29 days of disability with a low accident severity rate of 0.108.

The frequency and severity rates of injuries for the coal operations in the 1946 Competition were as follows: Anthracite: 91.053 injuries per million man-hours, 10,898 days lost per thousand man-hours; Bituminous, 45.087 and 10,181, respectively.

Following were the winners of certificate of honorable mention for outstanding safety records in anthracite mining: Hunter Tunnel mine, The Philadelphia & Reading Coal & Iron Co., Girardville, Schuylkill County, Pa.; Bear Valley mine, Level Coal Mining Co., Shamokin, Northumberland County, Pa.; Eckley mine, Jeddo-Highland Coal Co., Eckley, Luzerne County, Pa.; and No. 14 mine, Jermyn-Green Coal Co., Plainsville, Luzerne County, Pa.

In bituminous mining, certificate of honorable mention went to: Asco No. 2 mine, Atlantic Smokeless Coal Co., Asco, McDowell County, W. Va.; Freeport mine, Pond Creek Colliery of the N. & W. Ry. Co., So. Williamson, W. Va., Pike County, Ky.; No. 1 mine, Moore Branch Coal Co., Willard, Carter County, Ky.; and Reliance No. 1 mine, The Union Pacific Coal Co., Reliance, Sweetwater County, Wyo.

## Advances Noted in Education for Mining

College scholarships, foremen certification and plans for high-school courses in coal mining were announced recently in Pennsylvania, Kentucky and West Virginia, marking new steps in the industry's long-range efforts toward coal-mining progress.

In Plymouth, Pa., 55 men were given diplomas or certificates for attending classes conducted by the Pennsylvania State College Mineral Industries Schools in Nanticoke, Glen Lyon, Wanamie and Plymouth. Ten of

the group received diplomas for completion of the three-year course in special ceremonies held May 24. Principal speaker for the occasion was Edwin C. Curtis, mine inspector, 12th Anthracite district.

In Kentucky, the Princess Elkhorn Coal Co. announced that it would award two four-year tuition scholarships in mining engineering at the state university starting in September, 1947. Summer work in the mines will be offered recipients of the scholarships. The company also provides four high-school and two junior-college scholarships.

In West Virginia, A. J. Alexander, state mines chief, voiced his support of a plan to teach high school students how to mine coal. The plan originally grew out of a three-way meeting of state educators, coal operators and representatives of the U.M.W. Hope has been expressed that junior- and senior-class studies will be underway by September in three vocational high schools in Logan, McDowell and Mingo Counties.

## Men and Companies Win Heroism & Safety Awards

Medals and diplomas or citations were presented to 21 men associated with coal mining and 35 certificates of honor were given to coal mines for outstanding achievements in heroism and safety at the annual meeting of the Joseph A. Holmes Safety Association in Washington, D. C., May 20.

Coal-mining companies receiving certificates of honor were as follows:

1-B Mine, Amherst Coal Co., Amherstdale, W. Va.—for operating without a fatality from July 10, 1942, to Mar. 1, 1947, with an average of 135 employees working 1,557,571 man-hours, producing 1,202,930 tons of coal.

Zeigler No. 2 Mine, Bell & Zoller Coal & Mining Co., Zeigler, Ill.—for operating without a fatality from Oct. 18, 1944, to Feb. 28, 1947, with an average of 690 employees for a total of 2,499,874 man-hours and producing 3,079,595 tons.

Brock Mine No. 4, Brock, Inc., Cassville, W. Va.—for operating without a fatality from May 4, 1943, to Dec. 31, 1946 (and continuing) in the production of 3,102,122 tons.

Nemacolin Mine, The Buckeye Coal Co., Nemacolin, Pa.—for operating without a fatality for 673 working days from July 27, 1944, to Feb. 5, 1947, a total of 6,891,517 man-hours with 1,128 employees producing 5,669,177 tons.

Mine No. 7, The Carbon Fuel Co., Decota, W. Va.—for operating without a fatality from Nov. 24, 1939, to Mar. 1, 1947, with an average of 79 employees working 1,395,361 man-hours and producing 1,073,027 tons.

Hellier No. 2 Mine, Caudill-Ward Co., Hellier, Ky.—for operating an underground coal mine without a lost-time accident from June 1, 1944, to



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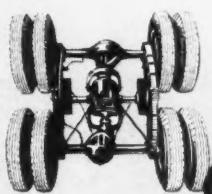


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Dec. 27, 1946, in the production of 251,942 tons employing an average of 43 men for 269,250 man-hours.

No. 2 Mine, Chafin-Jones-Heatherman Coal Co., Peach Creek, W. Va.—for operating without a fatality from Nov. 2, 1939, to Mar. 31, 1947, employing an average of 121 men, working 2,456,603 man-hours and producing 2,843,292 tons.

Mine No. 207, Consolidation Coal Co., Jenkins, Ky.—for operating without a fatality from Dec. 28, 1944, to Dec. 31, 1946, for a total of 2,624,914 man-hours producing 1,562,967 tons.

Gauley No. 2 Mine, Elk Lick Coal Co., Jerryville, W. Va.—for operating without a fatality from Jan. 23, 1940, to Dec. 31, 1946, with 218 employees producing 2,073,037 tons.

No. 16 mine, Island Creek Coal Co., Verdunville, W. Va.—for operating without a fatality from Feb. 21, 1945, to Mar. 30, 1947, with a total of 200 employees, working 1,222,130 man-hours in the production of 1,323,675 tons.

No. 23 Mine, Island Creek Coal Co., Holden, W. Va.—for operating without a fatality from Oct. 30, 1945, to Apr. 1, 1947, employing 425 men for a total of 1,362,328 man-hours in the production of 1,334,285 tons.

Crichton No. 1 Mine, Johnstown Coal & Coke Co., Crichton, W. Va.—for operating without a fatality from Dec. 15, 1941, to Mar. 15, 1947, with 227 employees working 2,614,107 man-hours and producing 1,576,065 tons.

Powellton Six Operations, Koppers Coal Division, Powellton, W. Va.—for operating without a fatality from Jan. 1, 1945, to Mar. 31, 1947, with an average of 664 employees working 3,019,052 man-hours and producing 2,092,854 tons.

MacGregor No. 6 Mine, Logan County Coal Corp., Slagle, W. Va.—for operating without a fatality from the time the mine was opened in May, 1941, to Feb. 28, 1947, with an average of 196 employees working 2,319,269 man-hours and producing 3,035,640 tons.

Bergoo No. 3 Mine, Pardee & Curtain Lumber Co., Bergoo, W. Va.—for having operated without a fatality from Oct. 6, 1937, to Mar. 1, 1947, with an average of 162 employees working 2,999,155 man-hours in the production of 1,679,288 tons.

Mine 58, Peabody Coal Co., Taylorville, Ill.—for operating without a fatality from June 17, 1941 to Mar. 12, 1947 (and continuing) with an average of 420 employees working 5,175,835 man-hours and producing 7,031,035 tons.

Princess Elkhorn No. 1 Mine, Princess Elkhorn Coal Co., David, Ky.—for operating without a fatality from Sept. 10, 1942, to Dec. 21, 1946, a total of 2,163,328 man-hours with an average of 265 employees and producing 1,883,699 tons.

Pursglove No. 2 Mine, The Pursglove Coal Mining Co., Pursglove, W. Va.—for operating without a fatality from July 9, 1942, to Dec. 31,

1946, in the production of 2,094,705 tons.

Brownsville Junction Mine, Republic Steel Corp., Brownsville, Pa.—for operating from Mar. 10, 1944, to Dec. 31, 1946, with an average of 310 employees producing 983,178 tons without a fatality.

Crescent No. 2 Mine, Republic Steel Corp., Charleroi, Pa.—for operating without a fatality from Apr. 11, 1945, to Dec. 31, 1946, with an average of 531 employees in the production of 1,271,411 tons.

Northern Coal Mines, Republic Steel Corp., Uniontown, Pa.—for having 10 underground officials working in 6 mines who have supervised their sections without a lost-time accident from 3½ to 7 years with an accumulated production of 2,051,373 tons in 1,460,704 man-hours.

Russellton Mine, Republic Steel Corp., Russellton, Pa.—for operating without a fatality from Dec. 27, 1941, to Dec. 31, 1946, with an average of 459 employees in the production of 3,648,928 tons.

Virginia Mine, Republic Steel Corp., Bessemer, Ala.—for operating an underground coal mine for 1,804 days without a fatality with an average of 261 employees working 2,740,521 man-hours and producing 1,185,957 tons.

Rochester & Pittsburgh Coal Co., Indiana, Pa.—for the outstanding safety efforts of 59 of its supervising officials in having no lost-time accidents for periods ranging from 1 to 4 years and totaling 70 years with total man-hours of exposure in excess of 1,250,000.

Spruce River No. 4 Mine, The Spruce River Coal Co., Ramage, W. Va.—for operating without a fatality for nearly 15 years (Mar. 17, 1932, to Feb. 1, 1947), a total of 3,009,196 man-hours in the production of 2,280,629 tons of coal with an average of 168 employees.

Hanna No. 4-A Mine, Union Pacific Coal Co., Hanna, Wyo.—for operating a fully mechanized mine without a fatality from Oct. 23, 1945, to Jan. 31, 1947, with an average of 234 employees, working 672,362 man-hours and producing 1,051,073 tons.

Reliance No. 11 Mine, Union Pacific Coal Co., Reliance, Wyo.—for producing 1,444,563 tons of coal with 102 employees working 1,437,760 man-hours without a fatality.

Superior D. O. Clark No. 7 Seam, Union Pacific Coal Co., Superior, Wyo.—for operating without a fatality from Apr., 1938, to Jan. 31, 1947, with an average of 175 employees, a total of 2,832,548 man-hours in the production of 3,223,051 tons.

Winton No. 7½ Mine, Union Pacific Coal Co., Winton, Wyo.—for operating without a fatality from Oct. 22, 1942, to Jan. 31, 1947, a total of 1,810,727 man-hours and producing 952,041 tons.

No. 6 Mine, United States Coal & Coke Co., Gary, W. Va.—for mining 1,304,595 tons of coal without a fa-

tality from Mar. 14, 1946, to Feb. 19, 1947, with an average of 600 employees for a total of 1,392,403 man-hours.

No. 9 Mine, United States Coal & Coke Co., Filbert, W. Va.—for mining 2,219,011 tons of coal without a fatality from June 18, 1942, to Feb. 19, 1947, a total of 2,331,198 man-hours for 243 employees; and for having no lost-time accident from June 14, 1945, to June 20, 1946, in the production of 382,710 tons in 381,426 man-hours.

No. 12 Mine, United States Coal & Coke Co., Anawalt, W. Va.—for operating without a fatality in the production of 1,804,352 tons of coal from Jan. 28, 1921, to Nov., 1923, and Jan. 10, 1943, to Feb. 19, 1947, a total of 1,547,341 man-hours with an average of 121 employees.

Nos. 30 and 31 Mines, United States Coal & Coke Co., Lynch, Ky.—for producing 1,913,367 tons of coal during 1946 with only one fatality with an average of 2,000 employees working 3,540,492 man-hours.

McCullough Mine, Westmoreland Coal Co., Claridge, Pa.—for operating without a fatality from Dec. 8, 1943, to Feb. 1, 1947, for a total of 2,644,094 man-hours producing 1,582,235 tons.

Westmoreland Coal Co., Irwin, Pa.—for having only 1 fatality in the operation of its five bituminous mines from Jan. 1, 1946, to Feb. 1, 1947, a total of 2,232,452 man-hours producing 1,639,128 tons with 1,205 employees.

The Safety Award Committee also presented certificates of honor for long-standing safety records to the following persons employed in the coal industry:

**Edward William Armbruster**, Valley Camp Coal Co., Elm Grove, W. Va.

**George Byers**, electrical foreman, The Buckeye Coal Co., Nemaclinton, Pa.

**Benjamin Caine**, mine foreman, Union Pacific Coal Co., Superior, D. O. Clark No. 7 Mine, Superior, Wyo.

**Victor Campbell**, assistant mine foreman, The Buckeye Coal Co., Nemaclinton, Pa.

**George Chamberlain**, Hanna Coal Co., Dillonvale, Ohio.

**S. J. Chewning**, outside foreman, Consolidation Coal Company (Ky.), Jenkins, Ky.

**Charles E. Collins**, outside foreman, U. S. Coal & Coke Co., Lynch, Ky.

**Charles K. Merrifield**, assistant foreman, Industrial Collieries Corp., Fairmont, W. Va.

**Oscar Moses**, section foreman, U. S. Coal & Coke Co., Lynch, Ky.

**Ralph Palcho**, assistant mine foreman, The Buckeye Coal Co., Nemaclinton, Pa.

**William Pfluge**, Valley Camp Coal Co., Elm Grove, W. Va.

**Larkin C. Ramey**, Princeton, W. Va.

The following were awarded medals and/or diplomas for heroism:

**Dr. B. S. Clements**, Emery Cline, Chester McFalls, Ray Wise, Edwin Steffy, John Fagan, Pete Bazusky, John Kovach and Michael Dupkas.

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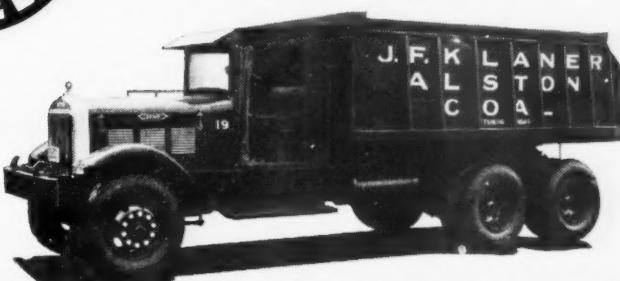
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WEST CHESTER  
PENNSYLVANIA

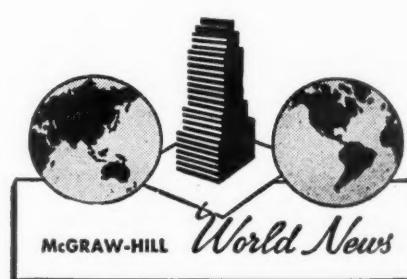
**Eight-Hour Day Ordered For Utah Miners**

Coal and metal mining companies in Utah were notified June 4 that they have until June 30 to revise their working schedules from a nine- to an eight-hour day. The order was issued by the Utah Industrial Commission after a ruling by the state attorney-general and after receipt of a resolution adopted earlier by the Sunnyside local of the U.M.W. The order will affect about 4,000 coal miners.

**Smokeless Stoker for River Boats**

Following a trial run on the Ohio River in the Huntington area June 8, officials and engineers of the Island Creek Coal Co. announced the success of their revolutionary fuel-feeding and stoking system for coal-burning river vessels. The new system, installed on the steamer *Catherine* of the Island Creek Fuel & Transportation Co., consists of automatic underfeed stokers specially designed to eliminate smoke and reduce fuel consumption. Results of the test run have persuaded Island Creek officials to install similar units on the steamer *Renown*.

In the new equipment, installed at a cost of about \$12,000, combustion space is tripled and coal is fed from underneath by automatic screws. Two-inch or smaller coal is fed from a large bunker through three 6-in. transmission pipes by three 5-h.p. engines, with an air flow from individual fan units for each feeder line. The underfeeding design allows 47 in. between the fuel-burning level and the boilers. Measurements indicate a 71-percent fuel-consumption efficiency as compared with the usual 50 percent.



LONDON—Provisional figures released by the National Coal Board showed British coal production of 4,044,000 tons in the week ending May 17, about 269,000 tons higher than in the previous week. In both weeks, British miners worked the new five-shift schedule. There were indications that the new production figures still would be short of the old six-shift level and that productivity per man-day still would have to move



No longer is it necessary to shove and tug at heavy control levers; no longer is output penalized due to operator fatigue. LIMA "Precision" air control has taken the effort out of operating by replacing the conventional hard-to-throw levers with positive, smooth operating air control valves—valves that require only a mere touch to put the machine through its paces. LIMA "Precision" air control clutches are free from constant adjustment. The next time you get a heavy-duty shovel, crane or dragline be sure to get a LIMA with "Precision" air control. LIMA paves the way to greater output with less operator fatigue.

**LIMA LOCOMOTIVE WORKS, INCORPORATED**  
Shovel and Crane Division      LIMA, OHIO, U. S. A.  
OFFICES IN PRINCIPAL CITIES



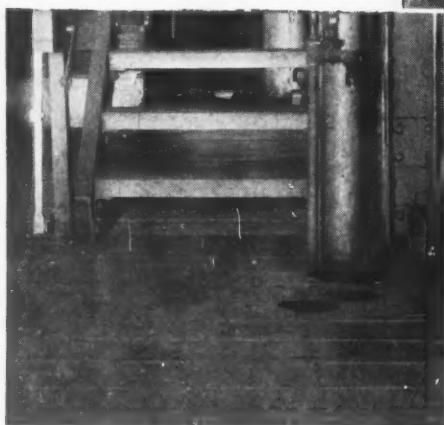
SHOVELS       $\frac{1}{4}$  YARD TO  $5\frac{1}{2}$  YARDS

CRANES      13 TONS TO 100 TONS

DRAGLINES      VARIABLE



Underground ↘



↖ Above Ground...

## "CZC"-treated timbers and ties save you money!

**REDUCE MAINTENANCE COSTS:** Timbers and ties treated with Chromated Zinc Chloride resist decay . . . retard fire. Replacements and repairs due to crushing, fire, and decay-weakened props are reduced.

**INCREASE SAFETY:** Treated timbering provides safety factors at the lowest cost—helps to eliminate dangerous roof falls and derailments. Because "CZC"-treated wood resists fire, it helps to reduce operating hazards which may occur by igniting of timber.

**LONGER SERVICE:** Treated timbers and ties usually outlast untreated timbering 5 to 9 times! "CZC" makes them more durable, better able to withstand continued usage.

Find out how "CZC"-treated timbering can result in greater safety and lower operating costs in your mine. Write to E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington 98, Delaware.



### DU PONT CZC

*Chromated Zinc Chloride*

WOOD PRESERVATIVE



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

upward to match prewar efficiency.

Opening of three new stripping operations in south Yorkshire to produce 290,000 tons was forecast for June and the start of a fourth operation was predicted after the gathering of summer crops.

Increasing use of oil instead of coal for gas manufacture was reported in May and it was estimated that gas works in 1947 would save 6,250,000 tons of coal by using about 216,000,000 gal. of oil. It was pointed out, however, that for every ton of coal not carbonized, half a ton of coke was lost to the market and that the fuel economy of the country could not be restored until full use was made of the nation's coal resources.

Cost of American coal imports to Britons will be about \$32 a ton, according to Fuel Minister Emanuel Shinwell in a speech to Welsh mine union leaders on June 9. Britain hopes to import 600,000 tons of coal from the United States this autumn. "The five-day week is working out very well, but it is too early to assess its value," Mr. Shinwell continued, and he predicted output of more than 4,000,000 tons weekly by mid-September. The minister's estimate of \$32 a ton for American coal was questioned by other British authorities.

**TOKYO**—Government control of some of Japan's coal mines was forecast as one of the first moves of the new Japanese cabinet in an effort to meet the nation's coal-production quota. The government, headed by a Socialist premier, was said to be considering expropriation of certain mines.

**BRUSSELS**—Twenty thousand more displaced persons are expected in Belgium from the United States zones in Germany and Austria within the next two months. They will swell the total of displaced persons working in Belgian coal mines to 26,000. A similar agreement for 15,000 workers has been made with British authorities in Germany. Most of the new workers are of Polish or Baltic origin. They will replace part of the 45,000 German prisoners of war who now are being released.

**MOSCOW**—An explosion-proof luminescent miner's lamp has reportedly been designed by the Soviet Scientific-Research Coal Institute in collaboration with the Physical Institute of the Academy of Sciences. According to reports, the lamp, which gives out light resembling daylight, represents a glass tube 12 or more in. long, with a diameter between 0.8 to 1.6 in. On both ends of the tube are electrodes made of tungsten wire covered with barium and stentium oxide. The tube contains mercury and argon vapors under light pressure. After being heated by electric current, a gas discharge is produced between the electrodes in the tube. Its light, in mercury and argon vapors, is rich with invisible ultraviolet rays.

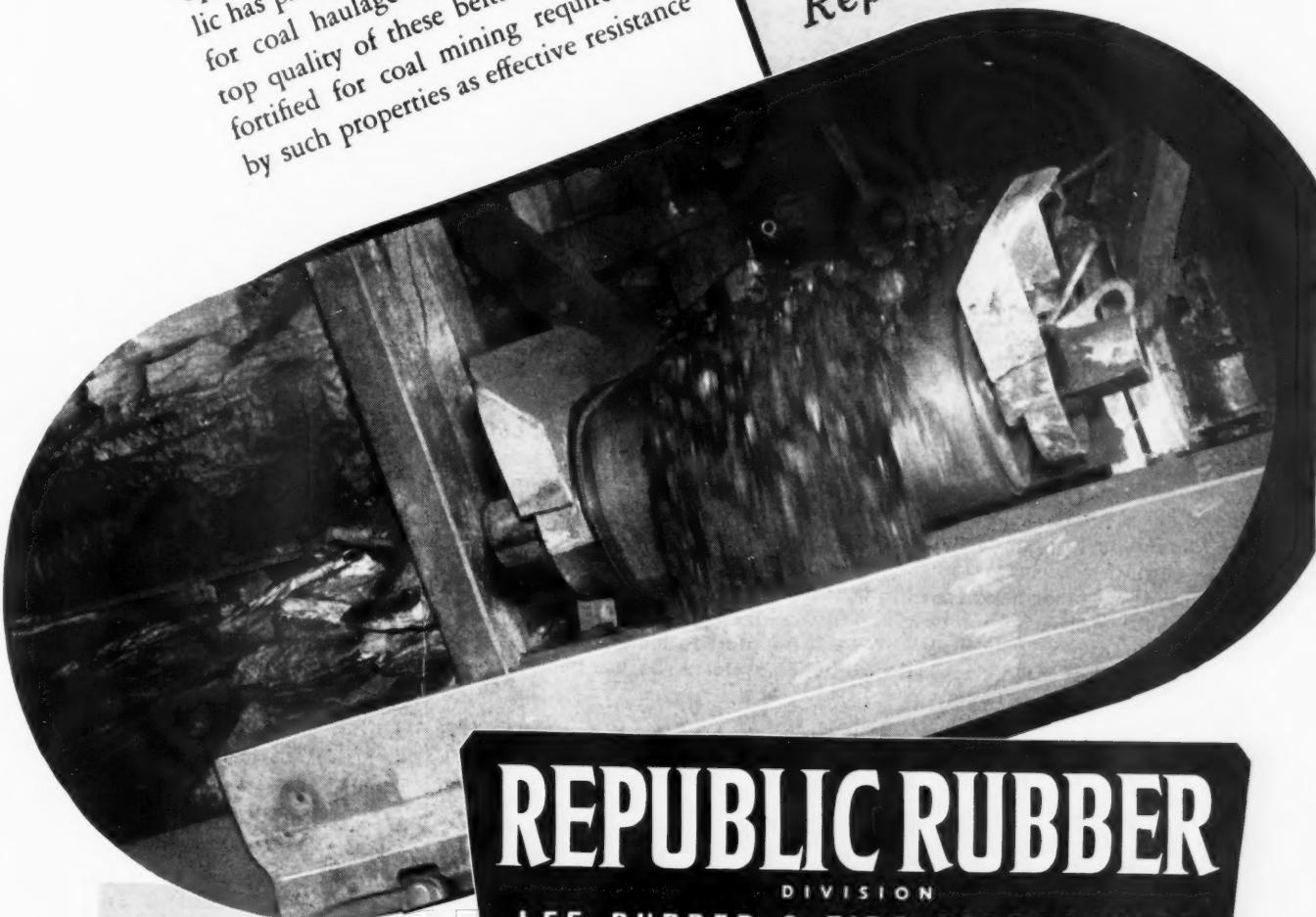
The Soviet mining industry has

# Efficiency of Method at its best REPUBLIC CONVEYOR BELTING

THE COMPARATIVE EFFICIENCY of handling materials by belt conveyor systems is a well demonstrated fact of modern mechanized production. The degree of benefit in reduced handling costs depends in great part, of course, upon the ability of the belt to stand up under operating abuse. For many years, Republic has provided specially designed belts for coal haulage systems. The overall top quality of these belts is specifically fortified for coal mining requirements by such properties as effective resistance

to impact from falling lumps, to abrasive shifting of loads and continuous flexing. Moreover, peak mechanical strength is preserved by an exclusive treatment for belt fabric, which permanently protects against mildew. Your efforts for increased efficiency have no more dependable support than the specialized engineering back of Republic Conveyor Belting.

Consult Your Nearby  
Republic Distributor



More Service  
from RUBBER  
for Industry

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DIVISION

LEE RUBBER & TIRE CORPORATION  
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REPUBLIC INDUSTRIAL PRODUCTS  
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LEE DELUXE TIRES AND TUBES  
CONSHOHOCKEN, PA.

# Let's Talk SECTIONALIZATION For Higher Production



Shorts, overloads and other faults in your mine electrical distribution system can cause costly damage to machinery and tumble your production schedule. That's why you should sectionalize your trolley and feeder circuits with I-T-E Type KSC Automatic Reclosing Circuit Breakers.

When a fault occurs, the KSC automatically opens, and recloses only when the fault has been corrected. It isolates the affected area to prevent interruption of production in other areas. This cuts lost time to a minimum—contributes to higher production.

As shown in the diagram above, a disconnect switch or protective device should be placed in every power line at not over 1500 foot intervals. An overcurrent protective device should be used in each circuit leaving a substation. These can be fuses or circuit breakers of the manual or the automatic reclosing type. (If circuit breakers are employed, trip free operating mechanism should be used.) The exception to this is where a substation feeds the main haulage only and only one haulage unit at one time. In this case only one breaker is required at the station.

There are other important applications—too numerous to mention here. Full details can be obtained by contacting the I-T-E Mining Specialist in your neighborhood. He will be glad to make an application analysis of your electrical distribution system. So use him—at no obligation.

## Be Wise SECTIONALIZE I-T-E Circuit Breaker Company

19TH AND HAMILTON STREETS, PHILADELPHIA 30, PA.  
(2ND OF A SERIES ON RECOMMENDED SECTIONALIZING PRACTICE USING THE KSC)



## SECTIONALIZING Switchgear

taken to using ferro-concrete tubular pit props and, according to reports, a special plant producing these pit props has recently been launched by the Ministry for the Coal Industry, with a daily capacity of more than 200 pit props.

Experimental application of these pit props at the Donets coal mines is reported to have produced good results, and it is proposed to use them also in the ore-mining industry. A second plant with a daily capacity of 250-300 ferro-concrete pit props is now under construction in the Krivoi Rog iron-ore mines area in the Ukraine, it is said.

A new mechanism called a hydro-drilling shield has been recommended by Soviet mining experts for drifting vertical pits. It is said to represent a giant drill, over 8 ft. in diameter, driven by a water turbine. After passing through the turbine, the water stream carries the rock broken up by the drill from the pit to the earth surface. The design and application of the hydro-drilling shield are still in an experimental state.

CAPE TOWN—South African legislators have given their blessing to the Liquid Fuel and Oil Bill, which gives assurances and safeguards to justify private enterprise developing an industry producing liquid fuel from coal, and to ensure that national and consumer interests are protected.

Recent technological advances give grounds for believing that oil can be economically produced in the Union from low-grade coal. The industry is expected not only to carry on without tariff protection, but be able to pay excise duties.

Present-day consumption in the Union is about 200,000,000 gal. a year, half in the Transvaal, but with the country's development this quantity will increase. Large quantities of low-grade coal in the Transvaal and Free State, which are not now being worked, will be developed to produce synthetic fuel.

To be economical, the industry will have to start big and will cost about £10,000,000 or £15,000,000 to bring it to production. It will be supervised by a Board and manufacturers will be subject to license. Because of the protection the industry will enjoy, there will be government control of profits so that surplus profits can be shared between producer and consumer. One member of Parliament thought it would be possible to produce from coal at 6d to 7d a gallon.

NEW DELHI, INDIA—Prospects of a vastly improved Indian coal output are seen as a result of an entirely new wage structure for miners recently approved by the Central Government.

Using approximate equivalents in U. S. figures, the revised pay structure increases the basic pay of miners, trolleymen and wagon-loaders from



*This Double Order*

Calls For

## Republic High Strength Steels

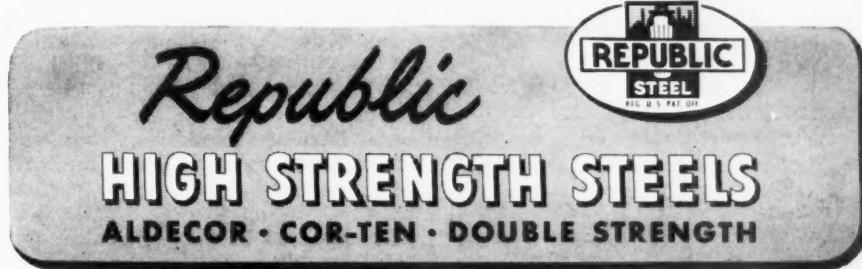
Modern mechanized mining keeps mine cars "on the go." Cars must be *mobile*, free from excess weight. But, they also must be *tough and strong*. And that double order calls for the physical properties of Republic High Strength Steels.

Republic's three *different* high strength steels—Republic ALDECOR, Republic COR-TEN and Republic DOUBLE STRENGTH—were developed for severe service. They provide high strength—a minimum yield point of 50,000 pounds—plus 4 to 6 times more resistance to atmospheric corrosion than ordinary structural steels in the unstressed condition.

That double advantage permits their use in thinner, *lighter* sections to increase car capacity without adding weight. Used in the same thickness as carbon steels, these low alloy, high strength steels build cars that are stronger and more durable—again, *without adding weight*.

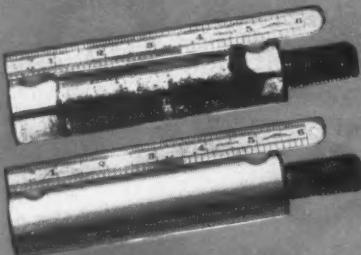
For the complete story of Republic's Three High Strength Steels, write for your copy of booklet No. 445. Write, too, for metallurgical assistance whenever you need it.

**REPUBLIC STEEL CORPORATION**  
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# LUBRIPLATE



## THWARTS CORROSION!

These originally identical shackle pins from a ten ton truck were used in a comparative lubrication test for a period of one year. A well known conventional lubricant was used on the upper pin. Note the pitting from corrosion, also the excessive wear. LUBRIPLATE was used on the lower pin. Its surface remained bright and true as when the test began, proof that LUBRIPLATE is different . . . better.

### LUBRIPLATE

Lubricants definitely reduce friction and wear to a minimum. They lower power costs and prolong the life of equipment to an infinitely greater degree. LUBRIPLATE arrests progressive wear.

### LUBRIPLATE

Lubricants protect machine parts against the destructive action of rust and corrosion. This feature alone puts LUBRIPLATE far out in front of conventional lubricants.

### LUBRIPLATE

Lubricants are extremely economical for reason that they possess very long life and "stay-put" properties. A little LUBRIPLATE goes a long way.

## LUBRIPLATE

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NEWARK 5, N. J.

REFINING CO.  
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DEALERS FROM COAST TO COAST  
CONSULT YOUR CLASSIFIED TELEPHONE BOOK

16 cents to 24 cents per load of 36 cu. ft. of coal (approximately one day's work at current standards) and sets a minimum wage for all categories of 16 cents per day.

In addition to this basic wage increase, the "dearness allowance," or cost-of-living allowance, long an important aspect of Indian pay schemes, has been increased to 150 percent (from 100 percent) of the basic wage for all workers receiving \$9 or less per month. And still further, an annual bonus is to be paid equal to four months basic wages. Of this, two-months bonus will be paid on an attendance basis—qualifying periods for underground workers being 190 days per year and for surface workers 265 days per year. The second half of the bonus, not quite accurately termed a "production bonus," will go to those workers who have qualified for the attendance bonus. It will be based on payment of an assessment by the mine owners of about 11 cents per ton of coal raised, which will be split up yearly among qualifying workers in proportion to their basic wages and subject to a maximum payment equal to two-months basic wages.

Still awaiting final action is another part of the plan which calls for the establishment of a "provident fund"—under which workers would contribute up to 6 percent of their basic wages, to be matched by a yet-to-be-determined employer contribution, to a fund which would be payable to them on severance of employment.

Meanwhile, Indian coal raisings in 1946 are reported to have increased slightly—but still fell far short of requirements. Total raisings in British India and the Indian States in 1946 was 29,276,893 tons, compared with 28,717,046 tons in 1945, and 25,368,879 tons in 1944. But shortages of equipment in the coal fields, railway-car shortages and communal riots hampered shipments sharply. These totaled 25,608,550, or 958,881 tons better than in 1945, but still only about 88 percent of allocations.

HYDERABAD-DECCAN, INDIA—Large scale plans for utilization of its immense coal reserves are being laid by Hyderabad State in India.

British consulting engineers have been called in and blueprints are being prepared for the establishment of an iron-and-steel plant, to be owned by the state, which will have a capacity of 500,000 tons of ingot a year.

Hyderabad coal is of the non-coking variety, but negotiations are said to have been completed for utilization of the Kaiser patents for coal carbonization. Reserves available for this purpose, and for other industrial uses, have not been completely surveyed, but the state is taking over 1,000,000 tons a year from one deposit where another 85,000,000 tons are estimated to lie. In addition to this one deposit there are several others of comparable size, it is said.

# A "Partly-Safe" Mine . . . IS NOT SAFE AT ALL!

The comprehensive, never-ending service rendered by Bituminous Safety Engineers is designed to keep your mine completely safe . . . not just "partly-safe." No detail is overlooked to help save lives and reduce the frequency and severity of accidents. In both laboratory and field work, Bituminous Safety Engineers develop and institute better safety measures to serve all mine owners, operators and workers. The program includes regular mine inspections . . . scientific elimination of hazards . . . teaching both workers and employers the importance of safety. Bituminous Safety Engineers make the company's slogan "Security With Service" a working pledge to every Bituminous Workmen's Compensation policyholder.

Assets Over \$17,000,000

**BITUMINOUS CASUALTY**  
CORPORATION  
ROCK ISLAND ILLINOIS

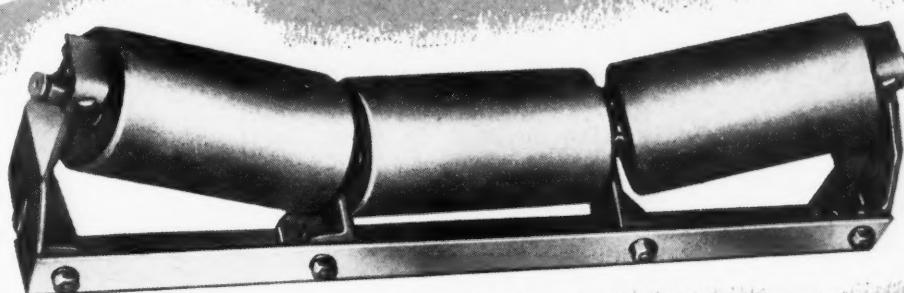
30 YEARS OF SERVICE TO THE INDUSTRY



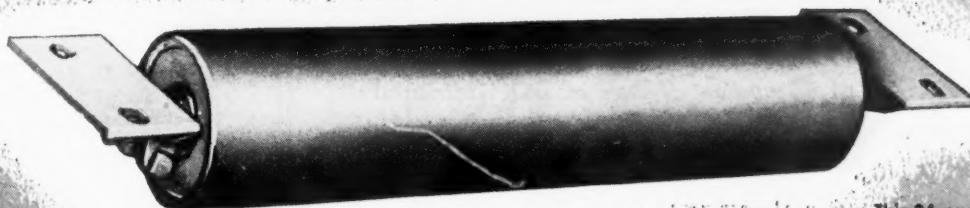
READY  
TO  
SHIP

# KEEP YOUR Conveyors IN PERFECT WORKING ORDER!

TRoughing ROLLS



RETURN IDLERS



This 24-page booklet is full  
of helpful information and  
data that will help you solve  
your conveyor problems.  
Ask for Bulletin BC-2.

*Send for this bulletin today!*

10 Different  
Standard Sizes  
in Stock,  
plenty of them too! Write today.

Cedarapids conveyor idlers are ideal for portable or stationary setups. Permanently sealed and lubricated for life, heavy duty, single row, self-aligning ball bearings require no maintenance. Idler rolls are of heavy gauge steel tubing to insure perfect and constant balance. Self-cleaning angle iron base provides plenty of strength and prevents building up of material that would stop rolls from turning freely. Strong, stubby spindles eliminate breakage usually encountered with long threaded shafts. And, best of all, they're ready for immediate shipment. Available in all standard sizes. Write today.



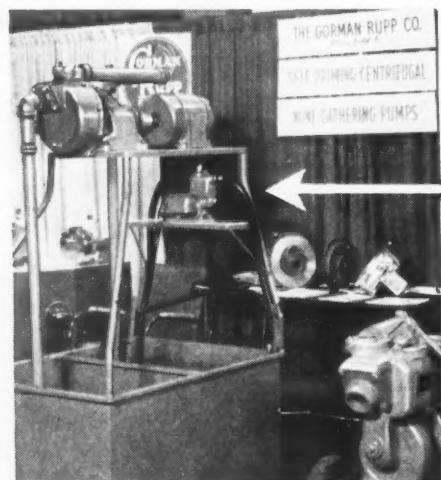
IOWA MANUFACTURING COMPANY  
Cedar Rapids, Iowa, U.S.A.

# CONTROL COAL DUST

with this  
Tiny  
"HANDY"  
PUMP



Safety in and around mines is being stressed as never before. This little "Handy" Pump has many mine applications. It is exceedingly valuable for coal dust control. Use it for spraying, mine gathering or a "thousand other uses". A husky, dependable trouble-free pump. An all-bronze self-priming centrifugal, this tiny pump is easily carried, weighing only 27 pounds complete. Fitted with pipe or common garden hose, it will lift water up to 25 feet. It delivers 8 GPM at 40 lbs. pressure. Equipped with Lamb Electric 1/2 HP universal type electric motor, 110/115 volt AC of 60 cycles or less or DC. Immediate shipment from Mansfield stock. Ask for the "Handy" pump.



You Saw It At  
The Coal Show  
in Cleveland

The "Handy" Pump's remarkable performance created a great deal of interest there. (See arrow at left.) The pump shown on top of the display is the Gorman-Rupp Model 9263 pump - the most dependable and trouble-free mine gathering pump made - five different sizes and capacities for any requirement. Ask for Mine Bulletin No. 301-46.



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306 BOWMAN STREET, MANSFIELD, OHIO

Distributed by: Guyan Machinery Co., Logan W. Va. — Weinman Pump & Supply Co., Pittsburgh, Pa. — McComb Supply Co., Harlan, Ky. — Bittenbender Co., Scranton, Pa. — Industrial Supply Co., Terre Haute, Ind. — Hoe Supply Co., Christopher, Ill. — Central Supply Co., Greenville, Ky. — Ebbert & Kirkman Co., Inc., Birmingham, Ala. — Henszey Co., Watertown, Wisc. — Union Supply Co., Denver Colo. — Mill & Mine Supply Co., Birmingham, Ala.

## Coal-Heat Service Issues Summer Promotion Packet

A "1947 Summer Promotion Package," including 30 newspaper advertisements for local group use, five direct mail pieces and an advertising-and-cut service, have been made available to local coal-heating service groups by the Coal Heating Service Division, National Coal Association, Washington, D. C. This seasonal program is part of the year-round merchandising plan growing out of the adoption by the National Coal Association in March, 1946, of a marketing plan for producer-retailer cooperation in better service to coal-burning homeowners.

Advertisements and promotion pieces in the summer package cover such activities as furnace conditioning and cleaning, stoker and heat-regulator sales, summer orders and coal heat for new homes.

## Personal Notes

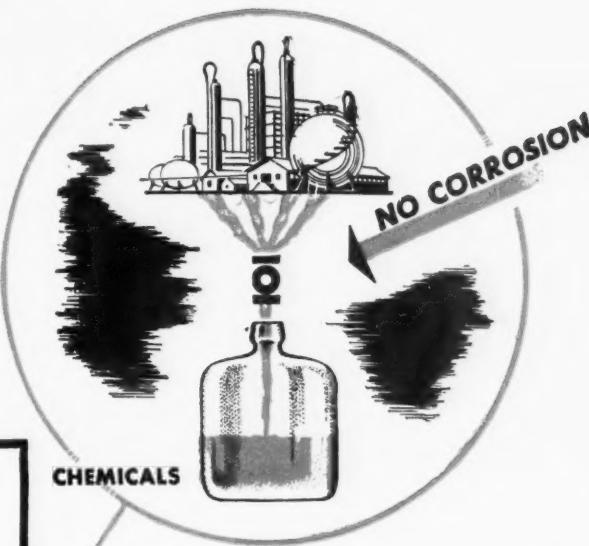
K. L. Konnerth, formerly assistant to the president in charge of engineering, has been named general manager of operations for the H. C. Frick Coke Co., U. S. Coal & Coke Co. and associated companies, Pittsburgh. A. J. Breitenstein, formerly chief engineer for the Frick company, has been appointed to succeed Mr. Konnerth and he has been succeeded by R. H. Knapp, previously mining engineer for Frick. G. M. Thursby, formerly director of industrial relations, H. C. Frick Coke Co., has been elected vice president in charge of industrial relations. G. W. Sweeny, auditor of the U. S. Coal & Coke Co., has been elected a vice president of the company. William Foster, general attorney, has been elected secretary of the H. C. Frick Coke Co., U. S. Coal & Coke Co., and associated companies.

Harold B. Wickey has been named superintendent, Mine No. 38, Consolidation Coal Co. (W. Va.), Fairmont, W. Va., succeeding J. C. Constable, resigned. Mr. Wickey was associated with the Davis Coal & Coke Co., Thomas, W. Va., from 1936, until May, 1942, as a mining engineer, when he joined the mining division of the War Production Board. He joined Consolidation as a special engineer on leaving the WPB in March, 1946.

James McDougall Sr., superintendent, Van Houten No. 4 mine, St. Louis, Rocky Mountain & Pacific Co., Van Houten, N. M., was to retire July 1 at the age of 70, after more than 53 years of service with the company. Mr. McDougall first joined the company in 1894 as a mule driver and held various supervisory positions before becoming mine superintendent, a



FOOD PRODUCTS



CHEMICALS



SUSPENDED SOLIDS

### GRINNELL-SAUNDERS DIAPHRAGM VALVES



- The flexible diaphragm isolates the working parts of the valve from the fluid, preventing contamination, and permits streamlined flow plus positive closure even with suspended solids.

A selection of diaphragm materials and also body linings of glass, porcelain, lead, rubber or synthetics protects against corrosion.

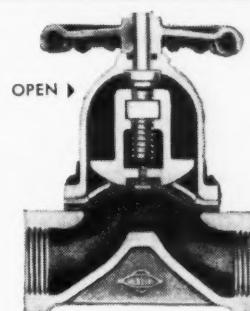
- No packing glands to demand constant attention. Non-rising stem eliminates breakage... sealed for protection from dust, weather and corrosion.
- Working parts completely isolated from the fluid. No sticking, corroding or clogging to interfere with easy operation and tight closure. No contamination from valve lubricants.
- Compressor and finger plate combine to support the diaphragm in all positions.
- The large area of contact of the diaphragm on the seat, plus the resilience of the diaphragm, permits positive closure even when foreign matter is trapped.
- No metal-to-metal seats to be-
- come damaged or wire-drawn.
- No refacing or reseating is required.
- Streamlined passage without pockets reduces friction to a minimum and prevents accumulation of sludge and foreign solids.
- The valve body—the only metal that could contact the fluid—can be completely lined with glass, porcelain, lead, rubber or synthetic compounds (flange type only) to suit service requirements.

*Write for catalog describing Grinnell-Saunders Diaphragm Valves—standard and specialty types.*

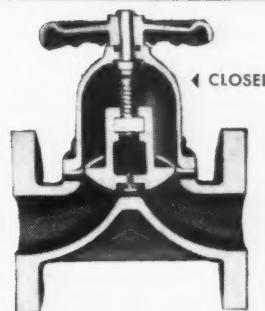
**GRINNELL COMPANY, INC.**

Providence 1, R. I., U. S. A.

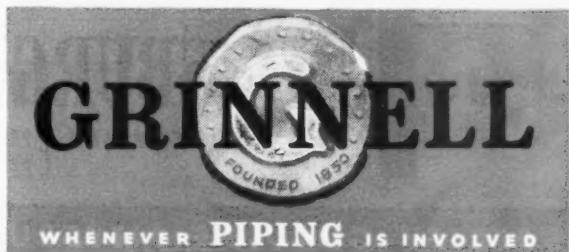
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**GENUINE  
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**for TROUBLE-FREE  
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"GENUINE PITTSBURGH GEAR" means renewal parts engineered to strict original specifications with 30 years gear-making and heat treating experience. Starting with finest materials obtainable, on through final protective finish and packaging that safeguard their built-in quality until ready for use, GENUINE PITTSBURGH GEARS are produced to give longer, trouble-free service on the job. Everywhere they are the standard choice of those responsible for coal production with a minimum of replacement and equipment maintenance.

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New Price List on Request

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**SPECIFY GENUINE PITTSBURGH GEARS**

position he has had for 28 years, four at the old Brilliant mine and 24 at the Van Houten mine. He is reported planning to move to California.

**James Ritchie**, superintendent, Mine No. 24, Peabody Coal Co., Catlin, Ill., until its closing about a year ago, has been named superintendent, Centralia No. 5 mine, recently purchased by the Peabody Coal Co.

**Forrest Given** has been appointed assistant mine foreman at No. 3 mine, Elk Lick Coal Co., Webster County, W. Va.

**P. R. Paulick**, Library, Pa., has resigned as general manager, Hellier Coal & Coke Co., to resume his practice as a consulting mining engineer. Previous to his connection with Hellier, Mr. Paulick for five years maintained a consulting practice and for three years preceding that was chief engineer for the Powhatan Mining Co.

**Walter Morgan** has retired as mine foreman, No. 18 colliery, Glen Alden Coal Co., Wanamie, Pa., after 42 years' service. **Hiram George**, mine foreman at Bliss colliery, has been appointed to succeed Mr. Morgan and **Harry Harris** has been promoted from section foreman to mine foreman at Bliss, in Mr. George's place.

**C. A. Gibbons** has been named director of anthracite sales for the M. A. Hanna Co., in addition to his present duties as vice president of the Susquehanna Collieries Co., Philadelphia.

**T. J. Liddle**, formerly inspector of mines for the Virginia Department of Labor and Industry, has been appointed safety inspector for the Stonega Coke & Coal Co., with headquarters at Big Stone Gap, Va.

•  
**Correcting the Record**

The June issue of *Coal Age* (p. 172) carried a report from a regular news correspondent that John B. Marchiando, former president of the Progressive Miners of America, had been appointed superintendent of Mine No. 2, Superior Coal Co., Gillespie, Ill. This was in error, company officials advising that Mr. Marchiando has been employed at Mine No. 2 as a miner. Consequently, *Coal Age* takes this opportunity of setting the record straight and expressing its regrets for inadvertently reporting to the contrary.

•  
**Obituaries**

**Robert F. Carson**, 75, secretary-treasurer, Dingess-Run Coal Co., died June 7 at his home in Huntington, W. Va., after a prolonged illness. Mr. Carson, who first came to Logan

## RUST PREVENTION

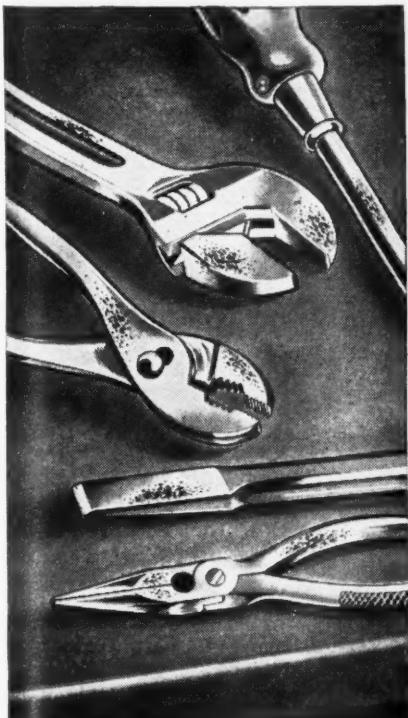
# \$100,000 Worth of Hand Tools saved from "RUST"

### NEW PRODUCT DOES THE JOB AFTER PLANT CONDUCTS EXHAUSTIVE TESTS

"Some time ago, we were called in by a prominent manufacturer.\* Corrosion of all metal parts in his entire plant had gone out of control. The machine shop and hand tools, valued in excess

**Lubrication  
Engineer's  
Report** tools, valued in excess of \$100,000, were a sorry looking 'dusty-brown.' Everything they had used in the way of rust preventives heretofore failed to solve their difficulty.

"After studying their problem we recommended our General Purpose



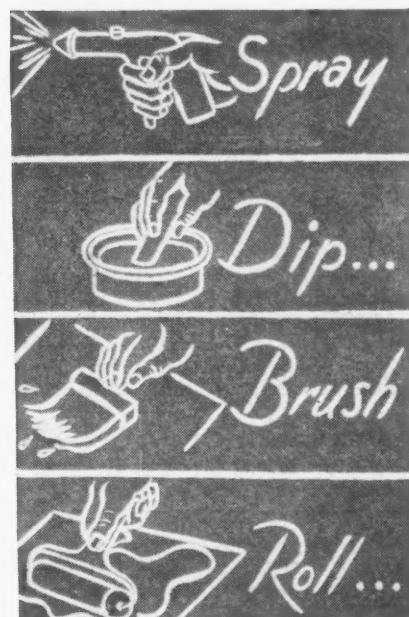
Anti-Corrode No. 100 and suggested that they give it exhaustive tests. Their chemist did so and we are happy to report that it solved their problem.

"They have since used over 150 gallons of this Anti-Corrode on everything metal in their plant, including small hand tools such as pliers and screw drivers."

Anti-Corrode No. 100 is one of several new types of Cities Service protective coatings for metals. Designed to prevent corrosion of raw stocks, finished parts and completed ma-

chines, it adheres firmly, displaces moisture and protects longer than many materials now on the market.

**Easy To Apply** Apply Anti-Corrode by ordinary work-shop methods. Spray, dip, brush or roll it on. The protective film is continuous and non-porous—does not break at sharp edges nor rupture on flat surfaces. It need not be removed from metal to be stamped, drawn or otherwise formed.



Cities Service will demonstrate the many advantages of Anti-Corrode to you in your own plant. Contact the branch office nearest you or write Cities Service Oil Co., 60 Wall Tower, New York 5, N. Y.

\*Name on request

**Cities Service means  
Great  
Service**



Cities Service Oil Co.  
NEW YORK - CHICAGO  
Arkansas Fuel Oil Co.  
SHREVEPORT, LA.

(This offer available only in Cities Service marketing territories East of the Rockies.)

**CITIES SERVICE OIL COMPANY**  
SIXTY WALL TOWER  
NEW YORK 5, N. Y., ROOM 125

Gentlemen: I'd like to test ANTI-CORRODE No. 100 on my own equipment FREE OF CHARGE. Send me details.

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

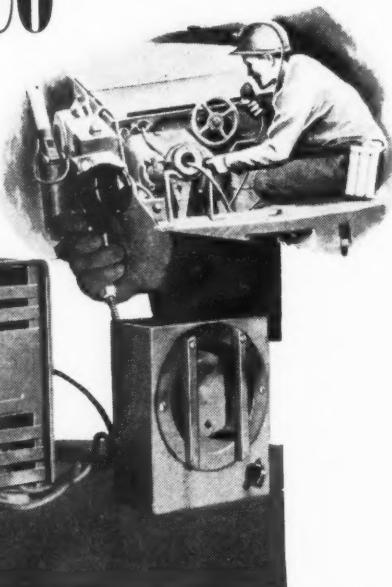
CITY \_\_\_\_\_ STATE \_\_\_\_\_

## COAL COMES OUT FASTER

"FEMCO" trolleyphones make possible instant voice contact with haulage or gathering locomotives anywhere in the mine . . . eliminates delay, helps move coal faster and permits efficient distribution of empty cars. One operator reported savings of \$40 to \$50 a day with this system! Write for complete information today!

### FEMCO

WHEN CARS AND  
LOCOMOTIVES ARE  
DISPATCHED WITH  
TROLLEYPHONE



**FARMERS ENGINEERING & MFG. CO.**  
549 BRUSHTON AVE. PITTSBURGH 21, PA.

*Operators say—“20%*  
**MORE EFFICIENT**  
*than average Storage*  
**Battery Locomotive”**

#### FEATURES

Double knee-action; better trackability. Floating power; less power consumption. Quick acting footbrake, essential for quick stopping, especially behind loading machines. Brake shoes that follow the wheels (due to knee-action). Adjustable Timken Bearings throughout. Huskiest transmission in any storage battery locomotive. Never leaks oil. Never add oil. Use regular auto oil; change every 6 months. Strong. Simple Design. Low maintenance. Backed by over 25 years of experience with Storage Battery locomotives.

THE  
**GREENSBURG**  
**“MONITOR”**

FRANKLIN COUNTY COAL CORPORATION  
NO. 12



12 MONITORS

In use by Franklin County Coal Corporation  
8 at Herrin, Ill. 4 at Royalton, Ill.

The Greensburg "Monitor" Type is the first real improvement in storage battery locomotives. ENTIRELY NEW IN DESIGN. Its efficiency and economy have been proven in actual mine use. Operators report 20 to 25% more coal hauled than with other battery locomotives having the same battery capacity. From 6 to 10 ton capacities: track gauges 36" to 56½". Other locomotives from 1½ tons to 10 tons, 16" to 56½" track gauge.

MORE  
HAULING  
FOR LESS  
STORAGE  
BATTERY  
CAPACITY

**THE GREENSBURG MACHINE CO.**

Makers of Custom-Built Storage Battery Locomotives

101 STANTON ST., GREENSBURG, PA.

County in 1903, retired last fall as chief engineer of the Dingess-Ran Coal Co. and Cole & Crane Real Estate Trust, but continued his affiliation with the companies as consulting engineer. He had been associated with the companies for more than 33 years and had been active in the design and installation of many large mines in that area.

**William H. Evans**, 71, president of the Mill Creek Colliery Co. and the Signal Knob Coal Co., Ansted, W. Va., died May 17 at his home in Ansted after a long illness.

**Robert M. Liversidge**, 47, purchasing agent, Lehigh Coal & Navigation Co., Philadelphia, Pa., died suddenly May 19, following a heart attack.

**Samuel Pursglove**, 72, who retired a few years ago as treasurer and general manager of the Pursglove Coal Mining Co., died June 10 at his home in Morgantown, W. Va., following a heart attack.

**Adam J. Sitki**, 48, superintendent, Mine No. 8, Peabody Coal Co., Tovey, Ill., died June 7 at a Jackson hospital following an illness of three weeks.

**Bruce Parson**, 58, mine examiner, Zeigler No. 2 mine, Bell & Zoller Coal & Mining Co., Zeigler, Ill., died May 20, following a heart attack as he was about to go underground.

#### Association Activities

Southwestern Interstate Coal Operators' Association, at its annual meeting at Pittsburg, Kan., June 10, re-elected Joe F. Klaner Jr. president. H. H. Spencer, formerly a director, was named vice president for Missouri, and John W. Mackie Jr. was elected a director to succeed Mr. Spencer.

#### B. & O. Plans Order For 3,000 Hopper Cars

The Baltimore & Ohio R.R. will soon call for bids on 3,000 additional hopper cars, according to an announcement made June 9 by Roy B. White, president. Two thousand of these new cars will be of 70-ton capacity and 1,000 of 50-ton capacity. The new cars, it was said, will be in addition to 6,000 fifty-ton and 1,000 seventy-ton hopper cars already on order, 310 of which have been delivered.

#### Mine Equipment Show in Franklin County, Ill.

Fifty-six mining equipment manufacturers showed miniature and full-scale modern machinery valued at more than \$150,000 at the 100th meeting of the Mining Electrical Group at West Frankfort, Ill., June 4-5. The

# For Tough Pulls For Long Pulls ... Move It With Air!

If it's power, speed and stamina you want in a hoist, choose a Gardner-Denver. Then you'll get the s-m-o-o-t-h action of a Gardner-Denver 5-cylinder radial air motor that delivers high horsepower at all loads and speeds—yet is a miser on air consumption. Gardner-Denver provides a complete line of air hoists, both single drum and double drum types, for hoisting, hauling, dragging or scraping.

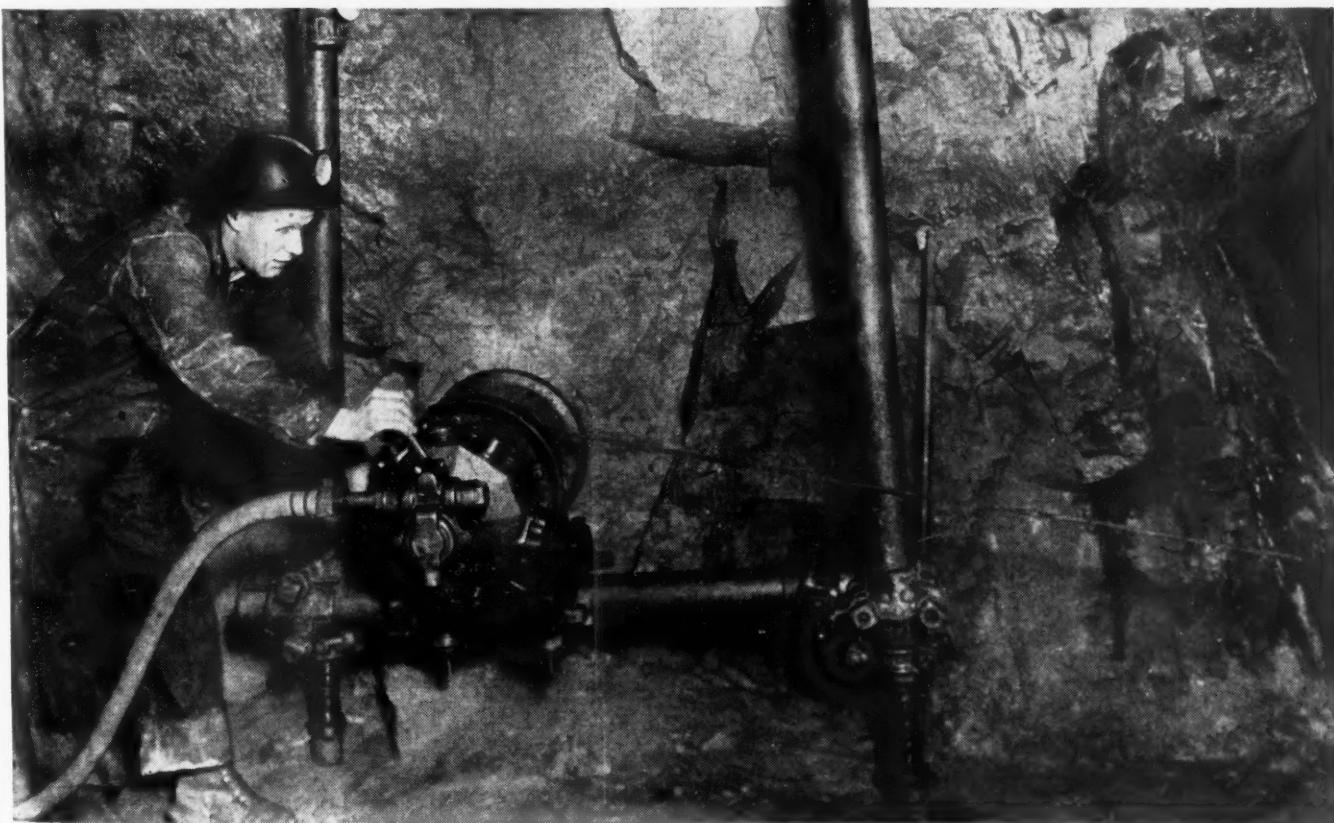
## Note These Quality Features:

\*Single drop-forged throttle lever operates hoist in either direction and automatically returns to neutral position when released.

\*Powerful band brake with conveniently located operating lever and quick adjustable take-up—provides safe suspension of any load within capacity of hoist.

\*Clutch cannot become accidentally disengaged due to its self-locking safety latch.

\*Complete, efficient lubrication of all moving parts.



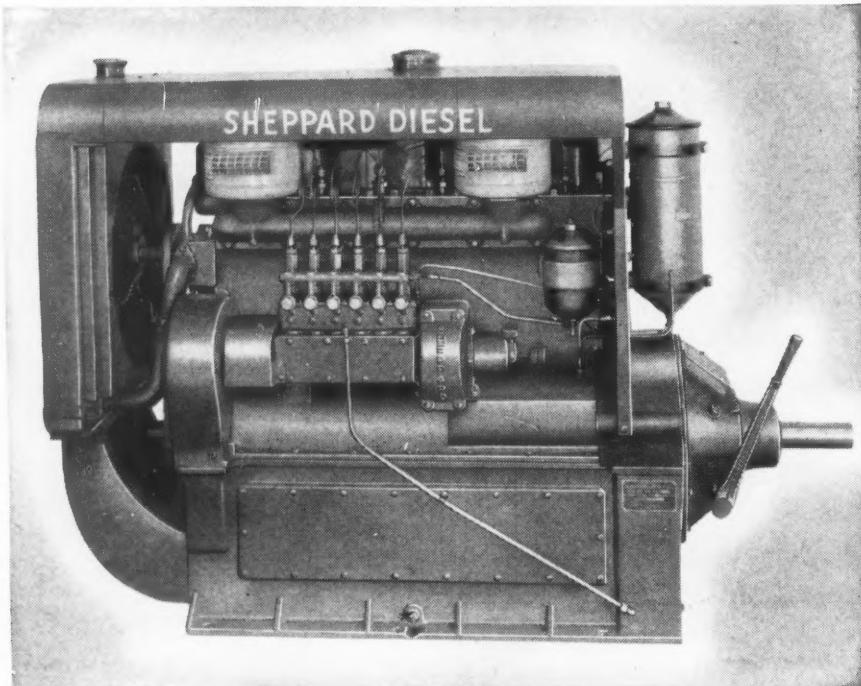
Gardner-Denver Model HK  
Hoist with Column Mounting  
installed underground.



For complete information, write  
Gardner-Denver Company, Quincy, Illinois

**GARDNER-DENVER** SINCE 1859

# MORE *Actual* POWER



## MEANS *Less* POWER COSTS

This 6 cylinder Sheppard Diesel . . . rated at 56 continuous H.P. at 1200 R.P.M. or 62 continuous H.P. at 1400 R.P.M. . . . will do the work of most 100 H.P. engines at a fuel cost of approximately 31c\* per hour when operating under full load.

### Why?

Because Sheppard Diesels are rated by their actual *continuous* power output when operating with *all* accessories. This is in sharp contrast with most engine ratings which are based on the *calculated* performance of a *bare* engine. Delivered complete with electric push-button starting, Sheppard Diesels are

simple to operate, easy to service. Their *full diesel* operation reduces power costs still further by eliminating the maintenance of an electrical ignition system and a carburetor.

Write today for literature and specifications on the model 12 Sheppard . . . the Diesel that delivers *all* the power you buy!

**R. H. SHEPPARD CO., INC., 11 Middle St., Hanover, Pa.**

Generating Sets, 2,000 to 36,000 watts • Power Units, 3½ to 62 continuous H.P.



\*Using 8½ gal. fuel oil.

show was arranged principally for coal-company purchasing agents and maintenance men. Membership in the organization totals more than 300 mine electrical maintenance officials and employees of southern Illinois coal companies.

## Preparation Facilities

**Cannelton Coal & Coke Co.**, Mine No. 100, Staten Run, W. Va.—Contract closed with Kanawha Mfg. Co. for complete coal-handling system consisting of trip-feeder with in-built track scale, power rotary dump, reciprocating feeder, shaking picking table, crusher, 600-ft. long, 3 ft. wide belt conveyor and loading terminal in tipple, all housed in steel structure; capacity, 250 t.p.h.; coal to be rotary dumped, scalped, and hand picked on shaking table, then either crushed or sent as mine-run to belt conveyor for transfer to tipple; provision to be made for future installation of preparation and cleaning plant at tipple site.

## Coal Publications

**Utilization of Washery Refuse as Boiler Fuel in Ruhr Coal Mines**, by A. L. Timmins. PB-46393, Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. 21 pp. Price: photostat, \$2; microfilm, \$1. Use of washery refuse for boiler fuel required such extensive capital expenditures as to make it economically unsound. In fact, it was never practiced extensively even in Germany.

**American Safety Standards**. American Standards Assn., 70 East 45th St., New York 17. 19 pp. 7¾x10½-in.; paper. A catalogue of approximately 200 safety and industrial health standards available to safety engineers and other interested persons. Titles and prices of those of special interest to coal men are as follows:

A17.2-1945—Inspection of Elevators. \$1.50.

B7-1943—Use, Care and Protection of Abrasive Wheels. 35c.

B15-1927—Mechanical Power-Transmission Apparatus. 45c.

B19-1938—Compressed Air Machinery and Equipment. 40c.

C1-1940—National Electric Code. 10c.

C2—National Electric Safety Code. Five parts, \$1.10 total.

C5—Protection Against Lightning. 20c.

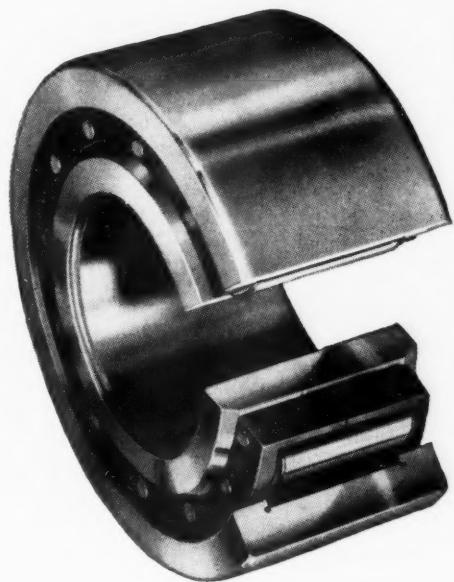
M12-1946—Construction and Maintenance of Ladders and Stairs for Mines. 30c.

M13-1942—Rockdusting Coal Mines to Prevent Coal-Dust Explosions. 20c.

M14-1930—Use of Explosives in Bituminous Coal Mines. 25c.

M15-1931—Safety Code for Coal

# REDUCE SHUT-DOWNS with ROLLWAY Right-Angle Loading



## Cut Maintenance Costs Get Longer Bearing Life

Right-Angle Loading splits compound loads into the two component parts of pure radial and pure thrust . . . and carries each of these components on separate bearing assemblies.

## ROLLWAY RIGHT-ANGLE-LOADED BEARINGS

### WHAT THEY DO

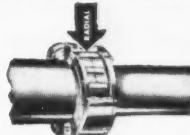
Prevent wedging of rollers and pinch-out • Reduce roller end-rub, with its wearing friction • Hold starting and operating torque at a minimum • Eliminate complicated stresses • Since only pure radial or pure thrust loads can be imposed on any single bearing assembly, unit pressures are substantially reduced • Since all loads are carried at right angles to the roller surface, compound or oblique loads are avoided, and so are the resultants of the oblique loads • Right-angle loading permits Rollway Bearings to carry greater radial or thrust load capacity in any given dimension • Right-angle loading assures solid cylindrical rollers of greater roller mass and uniform roller cross-section . . . greater resistance to shock loads and vibration . . . longer life expectancy under continuous heavy-duty service.

### FREE SERVICE!

necessary calculations, drawings and supply

Get the RIGHT Bearings for Your Particular Needs. Rollway Engineers will gladly make other required information for a complete understanding of your bearing needs. Strictly confidential. No charge, of course.

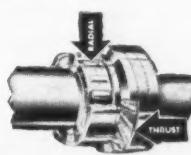
### HOW THEY WORK



When it's pure radial load, the load bears at a right angle to the rollers.



When the load is pure thrust, it bears at a right angle to the rollers.



When radial and thrust are combined, the two loads are resolved separately at a right angle to the rollers.

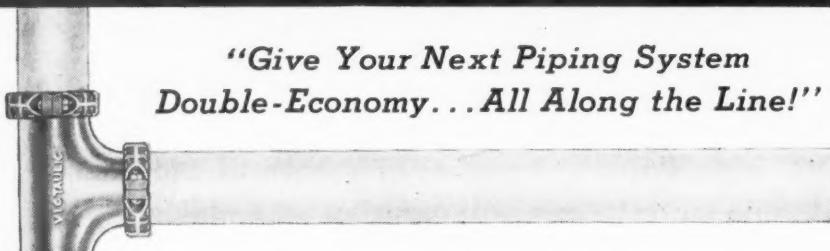
## ROLLWAY BEARINGS

ROLLWAY BEARING COMPANY, INC., SYRACUSE, N. Y.

SALES OFFICES: Philadelphia • Boston • Pittsburgh • Cleveland • Detroit • Chicago • Minneapolis • Houston • Los Angeles



**“Give Your Next Piping System  
Double-Economy... All Along the Line!”**



You've a good eye on the future... and a good grip on operational purse strings — when you equip pipe with VICTAULIC FULL-FLOW FITTINGS and COUPLINGS!

For instance... Victaulic FITTINGS are designed with long and easy sweeps that reduce frictional losses — increasing pipeline delivery *while lowering pumping costs!*

And then, too... Victaulic COUPLINGS have a two-bolt simplicity that saves both time and money in *quick and easy assembly, repair or salvage*. They make a flexible system, with a *union at every joint*. They automatically allow for contraction and expansion — are leak-tight under either pressure or vacuum — and make a slip-proof locked joint that can't pull out or blow off under pressure, vibration or sag!"

THAT'S WHY... to build long-lasting efficiency and *double-economy* all along your next piping system — make it completely Victaulic!

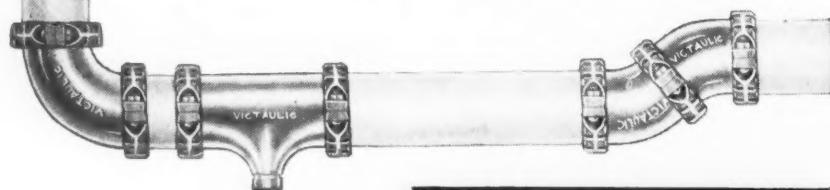
Write for new Victaulic Catalog and Engineering Manual

**VICTAULIC COMPANY OF AMERICA**  
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Have you considered Victaulic  
for your piping requirements?

Sizes —  $\frac{3}{4}$ " through 60"

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**SELF-ALIGNING PIPE COUPLINGS**  
**VICTAULIC**  
EFFICIENT FULL-FLOW FITTINGS

Mine Transportation. 20c.

Z49.1-1944—Electric and Gas Welding and Cutting Operations. 40c.

The following are under revision or temporarily out of print:

M2-1926—Installing and Using Electrical Equipment in Coal Mines.

M10 - 1928 — Miscellaneous Outside Coal Handling Equipment.

M11-1927—Wire Rope for Mines.

**Management's Internal "Public" Relations**, by Martin Dodge, James Farmer, Roderic Olzendam and G. B. Arthur Jr. American Management Assn., 330 West 42d St., New York 18; Personnel Series No. 102. 42 pp. 6x9-in.; paper. Price, \$1. Getting management's message across to employees and strengthening the company's personnel department.

**Power Factor in Your Plant**, by W. C. King. Cornell-Dubilier Electric Corp., South Plainfield, N. J., 1946. 214 pp. 6x9 $\frac{1}{4}$ -in.; imitation leather. Price, \$3. Clear, simple explanation of power-factor problems and what to do about them. Discussion of synchronous motors and capacitors. Many illustrations, with tables and charts to simplify computations.

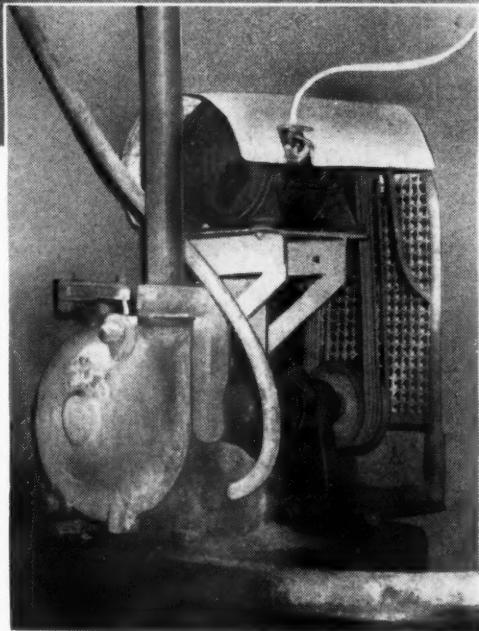
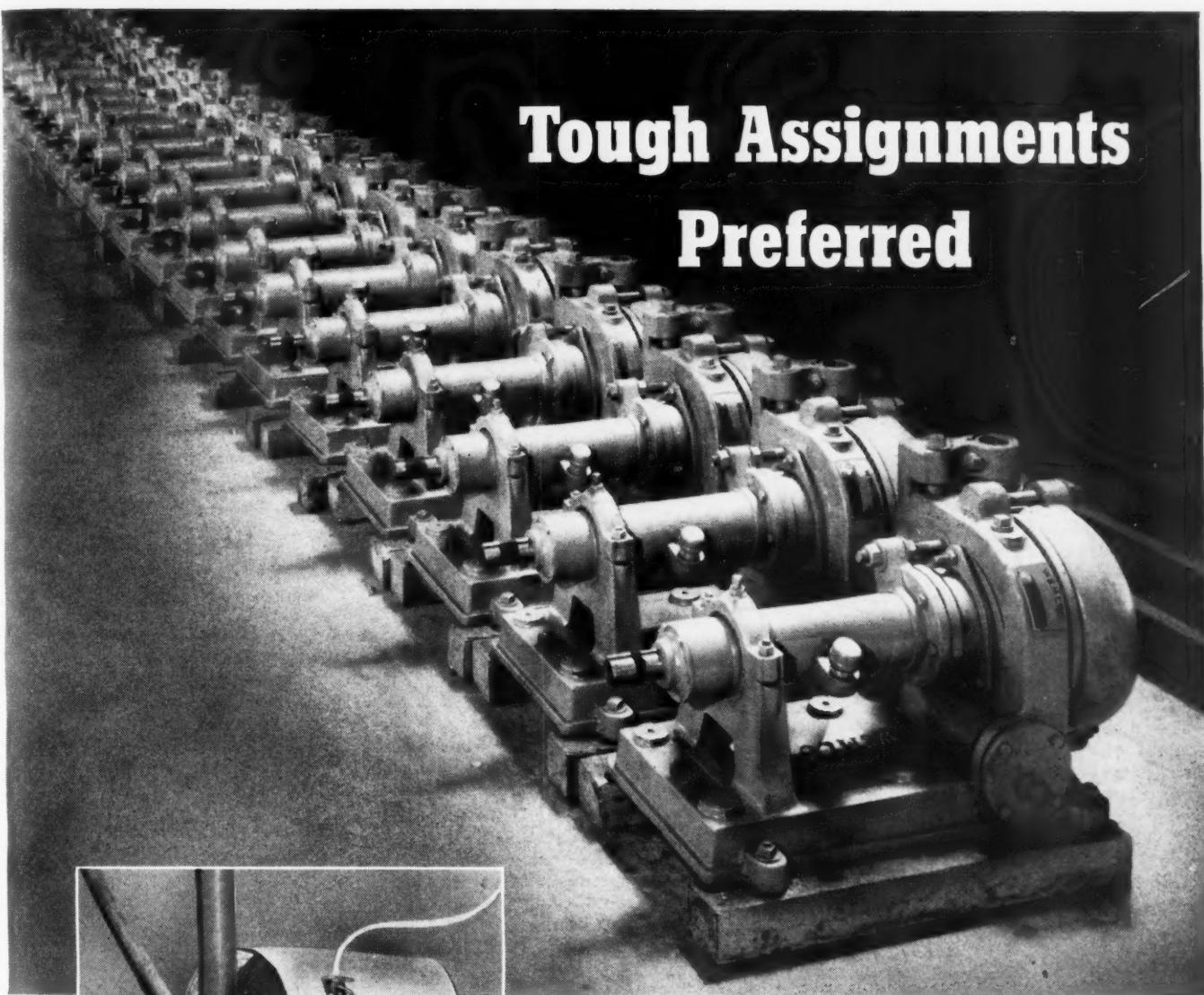
**Developing Morale**, by George D. Halsey. American Management Assn., 330 West 42d St., New York 18. 11 pp. 5 $\frac{1}{2}$ x8 $\frac{1}{2}$ -in.; paper. Price, 15c., quantity prices on request. Cornerstones of morale development: introduction to the job, appreciation of workers' efforts, respect for workers' feelings, fair treatment for all, fostering of pride in the job and the company and promotion of personal good will among workers.

**Role-Playing in Supervisory Training**, by L. P. Bradford and Ronald Lippitt. American Management Assn., 330 West 42d St., New York 18. 5 $\frac{1}{2}$ x8 $\frac{1}{2}$ -in.; paper. Price, 15c., quantity prices on request. Major weakness in supervisory training is failure to bridge the gap between theory and practice. The role-playing method enables supervisors and other trainees to act out the problems facing them.

**Economic Fundamentals of Collective Bargaining**, by F. D. Newbury, D. W. Rust and others. American Management Association, 330 West 42d St., New York 18; Personnel Series No. 103. 46 pp. 6x9-in.; paper. Price, \$1. Problems involved in wages and productivity, sharing cost savings with employees and discussion of the pattern of tomorrow's collective bargaining.

**Training for Management Skills**, by J. R. Bangs, L. F. Randall, D. McGregor and N. Randolph. American Management Association, 330 West 42d St., New York 18; Personnel Series No. 104. 32 pp. 6x9-in.; paper. Price, 75c. Discussion of plans for development of executive talent, re-evaluation of training for management skills and re-employment and training for veterans.

# Tough Assignments Preferred



Wemco Sand Pump ahead of  
zinc flotation circuit.

THESE rugged Wemco Sand Pumps are prepared to fill the toughest job you can give them. They're built to take it. Wearing parts are protected and fortified by "P-Mix," Wemco's especially developed extra-tough alloy that keeps Wemco Sand Pumps efficiently slugging it out ton after ton. Heavy duty bearings function smoothly for thousands of hours of trouble-free service. Thus, Wemco Sand Pumps raise your profits by keeping replacement costs down.

Let a Wemco engineer study your problems. His recommendations are based on many years of experience and can help you earn additional profits.

For specific data, write for Bulletin S.P. 1242-2.

Wemco Sand Pumps and parts are available  
for immediate delivery from stock.

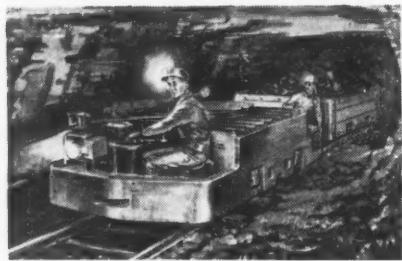
WM-15

THICKENERS • H.M.S. EQUIPMENT  
CONDITIONERS • SAND PUMPS  
CLASSIFIERS • ORE FEEDERS  
DIAPHRAGM PUMPS  
H.M.S. "MOBIL-MILL" • AGITATORS

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WESTERN MACHINERY COMPANY

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LOS ANGELES • SACRAMENTO • SALT LAKE CITY • SPOKANE • POCATELLO, IDA. • DENVER • PHOENIX • CHICAGO • WASHINGTON, D. C. • BARTOW, FLA. • NEW YORK



# Equipment News

More Detailed Information and Descriptive Literature Normally Are Available on Request Directly to the Manufacturer

## Storage Battery

A cadmium-nickel-alkaline storage battery, said to combine advantages of lead-acid and nickel-iron-alkaline batteries, has been introduced by Baker & Co., Inc., New York 17.

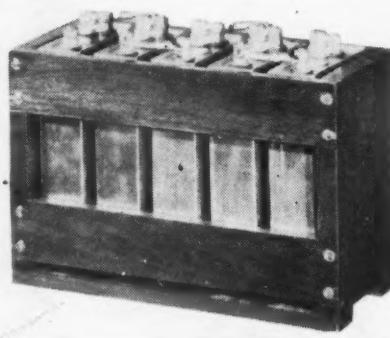
The new battery accepts high or low charge rates with no finish rate limitations, the manufacturer points out, and has excellent capacities at low electrolyte temperatures with no danger of damage due to freezing. It has a minimum spread between its charge and discharge voltages and is ideal for "floating" service applications. The battery has low internal resistance and will not self-discharge on open circuits.

The new battery is sturdily constructed of heavy, nickel-plated steel to withstand mechanical abuses. The active material is held firmly in perforated steel pockets to prevent shedding. There are no fumes to corrode steel or wood, thus making special installation precautions unnecessary, the company states.

## Earthmover

With the announcement of the Model T6 Traxcavator, Trackson Co., Milwaukee 1, Wis., has expanded its line of tractor-excavators to four, for four sizes of Caterpillar track-type tractors. The full line now includes capacities ranging from  $\frac{1}{2}$  to 4 cu.yd.

The T6 Traxcavator is mounted on and engineered as a unit with the Caterpillar D6 tractor, and buckets of  $1\frac{1}{2}$ - or  $1\frac{3}{4}$ -cu.yd. rated capacity are standard. Quarry, heavy duty and other buckets for special uses also can be supplied and a bulldozer blade,



quickly interchangeable with the bucket, is available.

While retaining all the basic operating and performance features of the Traxcavator line, the T6 is said to include many improvements that insure greater output at lower net cost per yard, easier handling and lower operating costs. It will load big hauling units or small dump trucks with equal ease—can dig the toughest soils or handle loose materials at low cost—and combines the usefulness of a shovel, loader, scraper and bulldozer, according to the manufacturer.

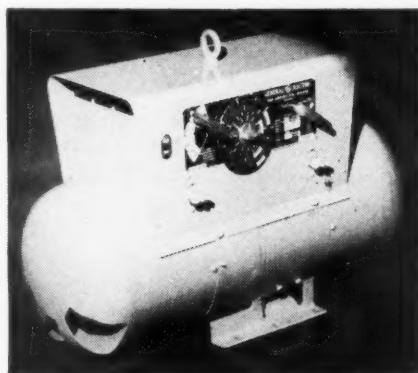
## Welder

A new line of single-operator high-speed d.c. arc-welding machines, Type WD-40, designed for 50-percent savings in size and weight and improved welding characteristics, has been announced by General Electric Co., Schenectady, N. Y. Operating at 3,500 rpm; the new welders are available in 200-, 300-, and 400-amp. models. Compact, weight-saving de-

sign makes them easily portable and saves floor space, the company states.

The arc is said to be easily established and maintained with the new welders because full arc voltage is generated instantly after short circuit, thereby avoiding unexpected pop-out of the arc. Excessive weld spatter is reduced because current peaks are adjusted for best performance on any setting. A new single-dial, dual-range control combines flexibility and precision of dual control, both broad and precise, with the convenience of single-dial control.

Short-circuit current peaks are adjusted to provide a stable arc with optimum striking characteristics. Instant recovery voltage is never less



than arc voltage on any current adjustment, assuring high-quality welding over the machine's entire range of current. This also facilitates striking the arc. Quick response and control of overshoot makes this machine favorable for vertical and overhead work without excessive spatter, the company states, and a broad current range makes it possible for all models to handle a wide variety of work.

## Belting

Hewitt Rubber Division, Hewitt-Robins, Inc., Buffalo, N. Y., has announced that Maltese Cross conveyor and elevator belting again is in production, after being withheld from manufacture during the war because of government restrictions.

Construction features of this belting, which give it extra strength, greater flexibility and longer service life, according to the manufacturer, include: special Hewitt-developed rubber compounds, which supply maximum resistance to abrasion, weathering, aging, heat, and sun-checking; selected staple cotton reinforcements



*A Big Bite Out of Costs*  
11.45% INCREASE IN CUBIC YARDS HANDLED  
by J&L PRECISIONBILT WIRE ROPE

**J&L  
STEEL**



This big dragline is operated in the Florida phosphate fields by the International Mineral & Chemical Corporation. Of three brands of drag cables used on it, one brand — J&L Precisionbilt Preformed Wire Rope — handled  $1\frac{1}{8}$  times the quantity handled by the next best and nearly three times

the quantity handled by the third brand. This extra service, typical of J&L Wire Rope, is helping to reduce costs in many fields. You can obtain these benefits by ordering from your nearest J&L sales office, distributor or by writing direct to the Wire Rope Sales Department.

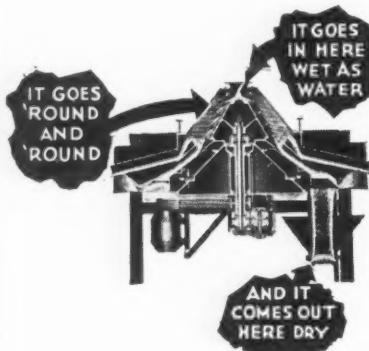
**JONES & LAUGHLIN STEEL CORPORATION**

GILMORE WIRE ROPE DIVISION

PITTSBURGH 30, PENNSYLVANIA

**J&L Precisionbilt PERMASET PRE-FORMED WIRE ROPE**

*The*  
**"C-M-I"**  
 CONTINUOUS  
 CENTRIFUGAL



For dewatering of any size below  $\frac{3}{8}$ ", the most uniform results are obtained from the "C-M-I". At many preparation plants a  $\frac{3}{8}$ " by 0 feed is reduced from over 30% moisture to less than 5% surface moisture. Other installations are dewatering minus 10 mesh sludge or slurry from as high as 82% water in the feed to under 7% surface moisture.

No matter what the maximum size of your fine coal, the "C-M-I" will deliver it drier and at a lower cost per ton than any other mechanical method.

**CENTRIFUGAL AND  
 MECHANICAL  
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 INC.

3600 SOUTH SECOND STREET  
 ST. LOUIS 18, MO.

to provide added strength and reduce stretch to a minimum; high flexing qualities, and resilient rubber frictioning between plies to assure maximum adhesion; scientific treatment of the entire belt carcass against mildew; layers of highly elastic skim rubber to provide added cushioning to withstand shock loads, increase flexibility and assure perfect troughing; tough cover anchored to carcass by special Dura-Bord breaker strip.

Maltese Cross belting is offered in straight-ply, stepped-ply and shock-pad construction. The latter is recommended by the manufacturer for unusually brutal service. The belting also is available in a special construction suitable for handling hot materials.

than 40 g.p.m. at a pressure of 120 lb. per square inch, and has a suction lift of over 30 ft., according to the manufacturer. An automatic bypass valve relieves pressure in excess of 150 lb. per square inch, and also furnishes manual relief where convenient in handling hoses. This bypass feature makes it possible to start pumping against a head of water.

The self-contained power source is a single-cylinder, air-cooled four-cycle 5-hp. engine, and the pump is mounted directly to the engine with power transmitted through a splined sleeve. The engine has its own crankcase oil supply, eliminating the need for pouring oil into the gasoline, and pump bearings are automatically lubricated.

### Rock Drill

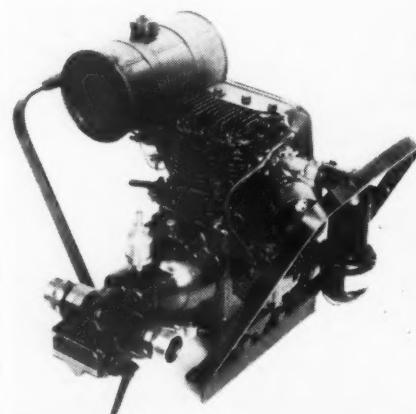
Ingersoll-Rand Co., 11 Broadway, New York 4, has announced a new lightweight rock drill in the 30-lb. class, the J-30 Jackhammer, designed for drilling medium to hard rock. Its power and light weight is said to make the J-30 an ideal rock drill for coal mining, for which job it is equipped with an extension grip handle and rider pads that make it easy to drill from a plank.

In addition to handling such jobs as drilling foundation holes in concrete, cutting hitches, block holing, trimming and cutting trolley hanger holes, the J-30 is said to have the reserve power to handle the occasional job usually done by a heavier machine. A new three-in-one backhead allows it to be easily converted to any one of three types of machines, wet, dry, or blower type, according to the manufacturer. In addition, the J-30 has a new sealed throttle valve, a stronger rifle bar, a two-piece chuck and a long wearing piston.

### Pump

A recent addition to its MP line, the MP Duraflex 6600, a portable high-pressure pump carrying rubber impellers, has been announced by Marine Products Co., 515 Lycaste Ave., Detroit 14, Mich.

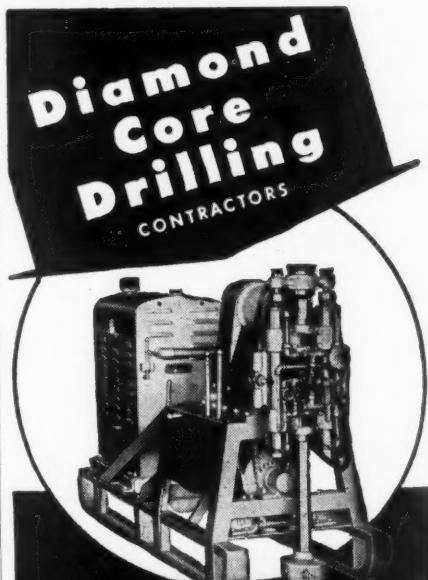
The Duraflex 6600 delivers more



### Electric Motor

Fairbanks, Morse & Co., Chicago, has introduced an entirely new type of electric motor known as the Axial Air-Gap—said by the company to be a revolutionary departure in motor design. In it, the magnetic lines of force follow a path parallel to the shaft (or axis of rotation), as compared to a radial path taken by the magnetic flux in the so-called conventional motor.

This new line of motors ranging in size from  $\frac{1}{2}$  to 10 hp. is suitable for horizontal or vertical flange mounting,



Testing mineral properties with our light gasoline drills. **SATISFACTORY COAL CORES GUARANTEED.** Ground solidification by our pre-pressure grouting method for shafts. Wetmine areas, horizontal holes for drainage. Electric drills for inside mine drilling.

**MOTT CORE DRILLING CO.**  
 HUNTINGTON • WEST VIRGINIA

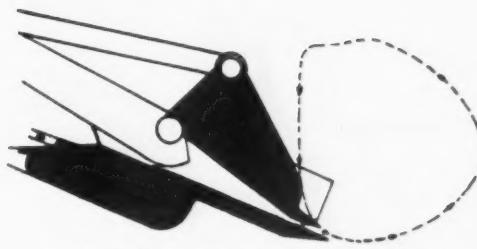
# Why YOU Need the "AUTOMAT" Shovel Action



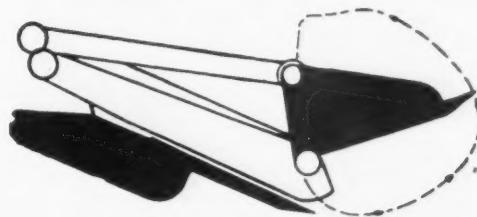
Coal mining men are, of course, primarily interested in a mechanical loader for its ability to load the most coal at the lowest cost. The Whaley "Automat" meets these primary requirements. But back of efficiency are other equally essential requirements.

The "Automat" shovel action loading head gives you a machine with two distinct advantages. First—safety. The "Automat" is safe at all times. With vertical plane loading action, there is no sudden side kicking of machine and consequently no danger of knocking out timbers or crushing men. Second—the smooth mechanical action of shovel is responsible in a large measure for the low power consumption. Only one 25 H. P. motor being required for maximum capacity operation of the "Automat."

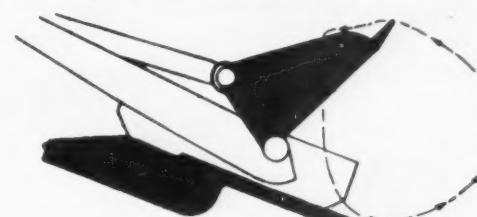
The "Automat" shovel loads the most fragile coal without degradation, loading in its stride, any lump of coal that will pass through your tipple, or any lump of rock your cars, aerial tram or laries, can take. Myers-Whaley Company, 177 Proctor, Knoxville 6, Tennessee.



The "Automat" shovel slips under the material to be loaded and



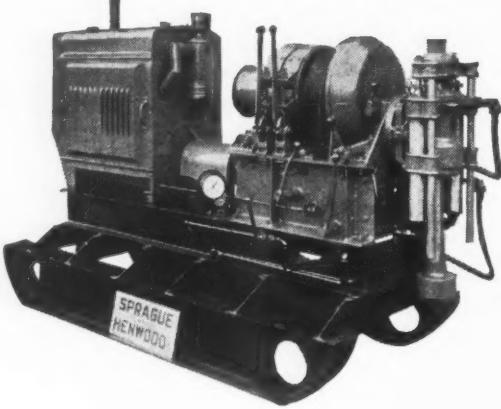
deposits the coal or rock on front conveyor, at an average rate of



3 tons per minute, maximum  
7 tons.

## MYERS-WHALEY

*Mechanical Loaders Exclusively for Over 39 Years*



***It's Engineered to Meet  
Your Most Severe Demands***

Sprague & Henwood Core Drilling Machines are modern in every respect . . . Can EASILY perform the work expected of them! That's because they are built to meet the demand of present day core drilling work! The machines are high speed, exceptionally sturdy, constructed to withstand rugged service. Available with two distinct types of feeds, "Screwfeed" and "Hydraulic," according to the type of swivel head selected. Have many exclusive features. Write today for full details.

# **SPRAGUE & HENWOOD, INC.**

**Dept. K** **SCRANTON, PA., U. S. A.**



Bortz DIAMOND BITS  
are also manufactured by  
Sprague & Henwood. Full  
details sent upon request.

or on an angle base for belt drive. The outstanding features are space and weight reduction, according to the manufacturer, the new motor being less than half the size of the conventional-type motor and weighing less by approximately 30 percent, yet retaining all the necessary sturdiness and power requirements. Other features include simplicity and speed of inspection, cleaning and lubrication; a cooler rotor; and much greater acceptability as flange-mounted motor with less overhang for unlimited machine application, according to the company.

## Cable-Control Unit

To provide a lower-cost rear-mounted double-drum cable-control unit for use with "Caterpillar" Diesel D6 and D7 tractors, Caterpillar Tractor Co., Peoria, Ill., is now producing a new cable control designated as the No. 23. Designed to develop line pulls ample to meet service requirements imposed by the operation of scrapers, bulldozers and rippers, the new cable control provides smooth, easy operation with a minimum of adjustments, according to the manufacturer. The No. 23 is said to offer all the features of the company's No. 25 rear double-drum cable control and its No. 24 single-drum front-mounted control, including the multiple-disk-type clutch.

Google

A new dust goggle, recommended for operations where fine dust particles and powder create a severe eye hazard and especially on operations using compressed air, has been announced by American Optical Co., Southbridge, Mass. In addition to protecting against dusts, this goggle provides exceptionally wide-angle vision, good ventilation, maximum comfort and safety, according to the manufacturer.

A fine wire screen (150-mesh) set behind a 16-mesh wire screen keeps out fine dust particles and powder. Sparks and flying objects cannot reach the eyes. The goggle is available with Super Armor-plate or 6 Curve Super Armorplate clear or Calobar lenses in medium, dark or extra dark shades.

## Photoprinter

Ozalid Division, General Aniline & Film Corp., Johnson City, N. Y., has announced the new Ozalid Streamliner as a positive-printing, dry-developing machine for the speedy reproduction of anything drawn, typed, printed or photographed on translucent material. A positive (not negative) copy is produced with no intermediate steps required, it is said. No chemical baths or inks are used and

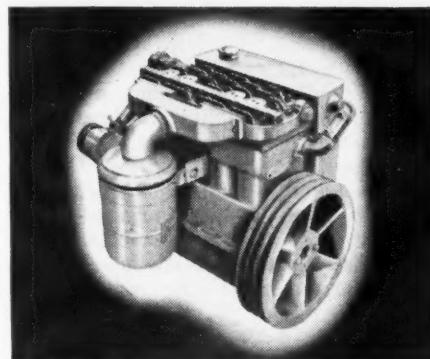
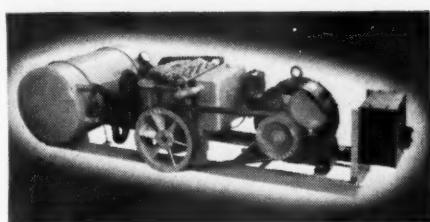
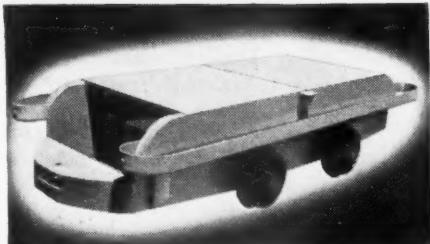


A special vehicle for underground transportation of personnel. Handles five men. Hauls men to working face quicker, without fatigue, enabling them to do a better job.

We completely overhaul and factory rebuild various kinds of mining machinery—cutters—loaders.

Phone  
Charleroi 750

# Lee-Norse Company

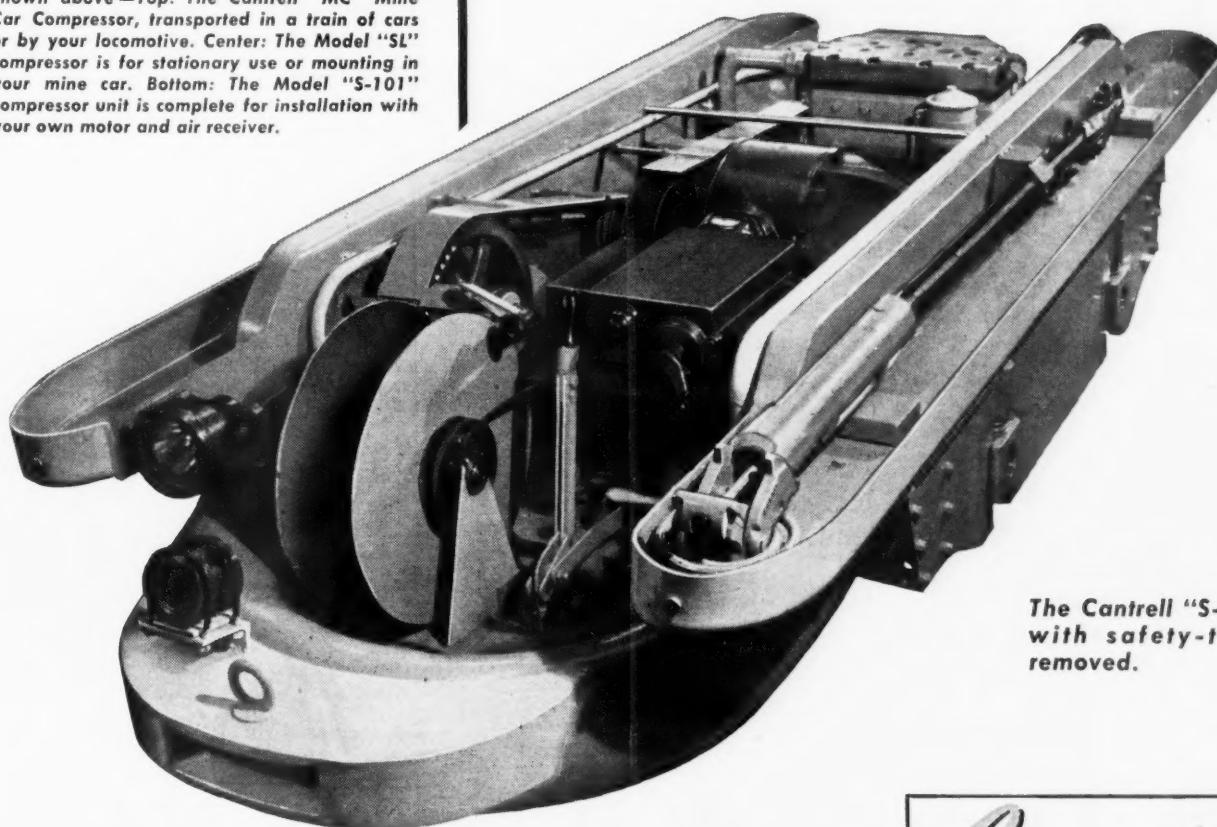


Shown above—Top: The Cantrell "MC" Mine Car Compressor, transported in a train of cars or by your locomotive. Center: The Model "SL" compressor is for stationary use or mounting in your mine car. Bottom: The Model "S-101" compressor unit is complete for installation with your own motor and air receiver.

## THE CANTRELL "SP" IS A COMPACT, EFFICIENT, COMPLETELY INDEPENDENT COMPRESSOR!

The Cantrell "S-P," Self-Propelled, Air Compressor not only delivers efficient dependable compressor service at any point in your mine, but does it without tying up the other work of heavy locomotives and crews. The "S-P" is the equivalent of a two-ton locomotive itself. Space is provided for tools, repairs, and workmen, and when there's air compressor work to be done, the "S-P" is ready to travel. At the job, a simple shift of lever, and motor is ready for compressor service. In addition, ditch lining, leveling haulways, shifting mining machines, hauling repairs and many other jobs, formerly requiring heavy equipment, are easily handled by the versatile Cantrell "S-P".

Imperial-Cantrell builds a compressor for every requirement of track, trackless or stationary use. Write today for information on the complete line of Cantrell Compressors.



The Cantrell "S-P"  
with safety-top  
removed.

**IMPERIAL-CANTRELL Mfg. Co.**  
JELlico TENNESSEE



**ONLY**  
**RUBEROID**  
**Insulating Tape**  
**has all these 7 Features**



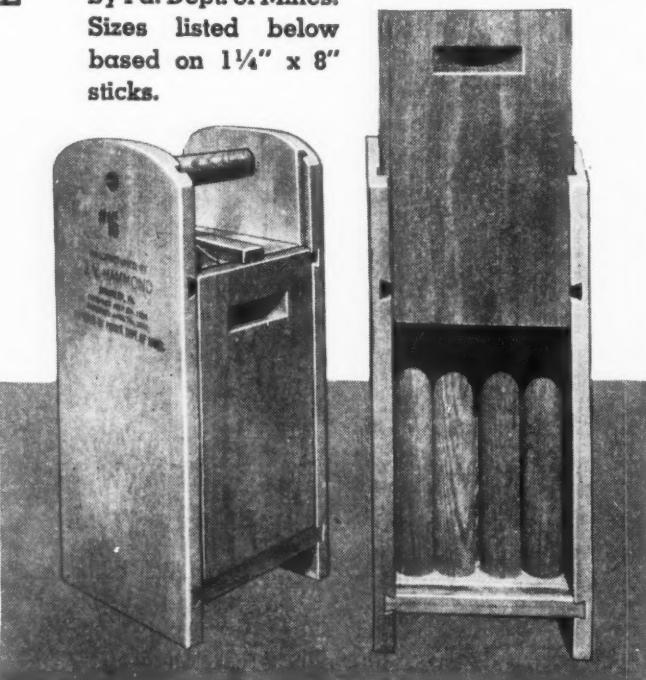
- 1 Double grip . . . both sides adhesive.
- 2 Great tensile strength . . . tough.
- 3 Won't tear, ravel or pucker.
- 4 Resists abrasion.
- 5 Acid- and alkali-proof.
- 6 Extra thick . . . one layer insulates.
- 7 Exceeds A.S.T.M. specifications by 300% in adhesiveness, 26% in tensile strength, 290% in dielectric strength.

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**INSULATING TAPE**

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Boxes Made in These Sizes:  
 No. 9 Powder Box, 9 stick size . . . \$1.85  
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 No. 16 Powder Box, 16 stick size . . . \$1.60  
 No. 20 Powder Box, 20 stick size . . . \$2.10  
 No. 36 Powder Box, 36 stick size . . . \$3.60  
 No. 50 Powder Box, 50 stick size . . . \$4.40  
 No. 72 Powder Box, 72 stick size . . . \$5.20  
 No. 6 Detonator Box, 2 1/2 x 3 x 6 inside \$1.20  
 No. 8 Detonator Box, 2 x 2 1/2 x 8 inside \$1.20  
 Special Sizes Made to Order  
 Patented July 8, 1924.  
 Patented Apr. 7, 1942



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prints are delivered completely dry, ready for immediate use after only two operations: exposure and dry development.

According to the manufacturer, only 25 seconds is needed to reproduce standard-sized engineering drawings, accounting reports, file cards, photographic film positives, and other translucent originals.

## Conveyor Belting

Rayestos-Manhattan, Inc., Manhattan Rubber Division, Passaic, N. J., has announced a new conveyor belt built with rayon-cord plies as a strength member, known as the Ray-Man Tension-Master Belt.

Designed to meet the needs of mechanized coal mines for a belt of higher tensile strength for increasing heavy-duty, long-lift conditions, the belt, according to the manufacturer, features toughness, fiber resilience, utilization of conventional type idlers and pulleys, field-splicing with conventional methods and construction modifications to suit varying service conditions. The belt is expected to replace series of belts and thus eliminate troublesome and costly transfers.

## Soldering Tool

The Ideal Thermo-Grip soldering tool has been completely redesigned, according to the Ideal Industries, Inc., 1013 Park Ave., Sycamore, Ill. Operating on the resistance-heating principle, the same as the previous Thermo-Grip models, the new unit is said to heat 20 percent faster, has thumb switch for close heat control, is modern in design, light-weight, compact, portable and can be used for long periods of time without overheating.

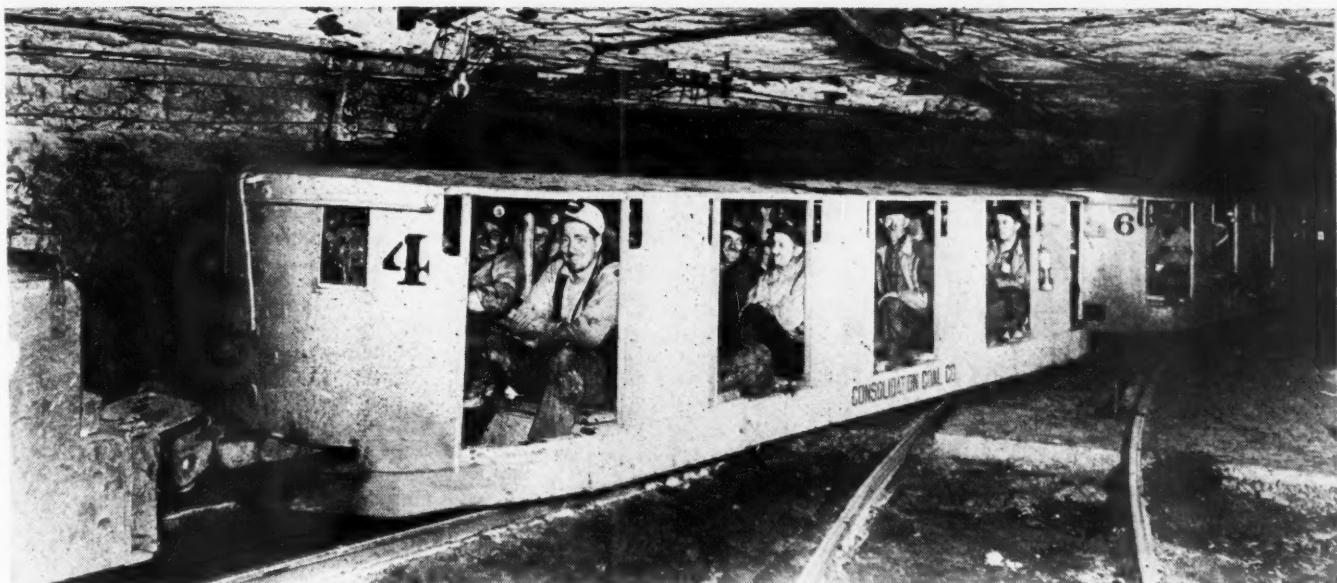
## Trade Literature

Available Without Charge on  
Request to the Manufacturer

**Rotary Dumpers**—Link-Belt Co., 300 West Pershing Rd., Chicago 9. Bulletin No. 2048-A is devoted to the various types of mine-car and railroad-car rotary dumpers, car-feeder haulage and refuse-car dumpers.

**Pumps**—Allen-Sherman-Hoff Co., 231 South 15th St., Philadelphia 2. Catalog No. 547 describes improvements made in the Hydroseal materials-handling pump since the war and includes construction, specifications, etc.

**Valves**—Alloy Steel Products Co., Linden, N. J., Catalog No. 47 describes all standard Aloyco corrosion-resistant valves and fittings and



*A speedy, safe and comfortable ride to and from working sections.*

### DIFFERENTIAL MANTRIP CARS

Cars are equipped with Differential AXLESS trucks having long and easy spring action. Wood slat seats and spring draft gears give a dry, comfortable ride. Car is entirely closed on both ends and one side protecting men from cold intake air. The utmost in roadability, even at high speed. Send for Bulletin D-54.

### DIFFERENTIAL REFUSE DISPOSAL EQUIPMENT

Differential has standard equipment for every refuse disposal problem. All equipment—whether 10 tons per hour, or 1,000 tons per hour—is sturdy, rugged and simple. On very steep grades Differential equipment performs in an outstanding manner. Builds and maintains the dump with the least labor cost. Send for Bulletin D-50.



*100 tons of mine refuse ascending 10% grade at 10 mph. Elevation gained rapidly. Dumping space conserved. Least labor cost per ton.*



*Dumps 3 ways. Extends the dump laterally and longitudinally at the same time gaining elevation at the desired rate. To extend dumping end door plows material over the end of dump.*

## DIFFERENTIAL STEEL CAR CO.

FINDLAY, OHIO

*Pioneer Builders of Haulage Equipment Since 1915*

MINE CARS--MANTRIP CARS--AIR DUMP CARS--ROCK LARRIES--DUMPERS--MINE LOCOMOTIVES.



built of helical coils of alloy resistance-wire, supported by an external frame for complete protection. Coils are alloy wire (contains no nickel) highly resistant to mine water or mill fumes. Vibration or sudden temperature changes will not affect coils. Units can be stacked and bolted together.

Write for catalog, shows all G.M.C. Mine Equipment.

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Machinery Co.  
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**FLEXIPIPE**  
The improved flexible tubing for  
mine and tunnel ventilation

This flexible air tubing is ready for immediate, easy installation. On account of its flexibility, it can be put up or taken down in a fractional part of the time required by more rigid means of face ventilation.

Write for free sample and full information

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412 Poplar Street, St. Louis 2, Mo.

## Conserve Power with **MOSEBACH** RAIL BONDS

To be absolutely sure that you're getting maximum conductivity, minimize power "leaks" by using MES-COWELD Flashwelded Rail Bonds. The patented flashwelding process prevents oxidization of copper wire at welded intersection.

There's a MOSEBACH Rail Bond for every bonding requirement . . . eighteen types in all. Write for complete details.



Type M8-F  
Rail Bond

**MOSEBACH ELECTRIC & SUPPLY CO.**

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includes construction and dimensional data and list of alloys in which each style is stocked.

**Acetylene Generators and Manifolds**  
—Air Reduction Sales Co., 60 East 42nd St., New York 17. Catalog describes and explains the complete line of Airco acetylene generators, both stationary and portable, and Airco oxygen and acetylene manifolds.

**Air Compressors**—Davey Compressor Co., Kent, Ohio. Bulletin includes photos and detailed mechanical specifications of 60-, 105-, 160-, 210-, and 315-c.f.m.-capacity portable air compressors and also describes the new Equi-Balanced crankshaft, a new development said to eliminate vibration and "rocking" and to increase compressor life by 50 percent.

**Lubricants**—Gulf Oil Co., 3800 Gulf Bldg., Pittsburgh 30. A fully illustrated brochure, entitled "Better Lubricants for Industry Through Research," presents the story of industrial-lubricant development ranging from modern techniques of oil discovery through refining, analysis, testing, and the creation of future products.

**Strip-Mine Lubrication**—Swan-Finch Oil Corp., RCA Bldg., New York 17. Booklet, "Moving Mountains to Get Coal," describes the use of specifically recommended lubricants in earth-moving equipment at five Pennsylvania strip mines, including the proper greases and lubricants for a 25-yd. dragline, well-drilling rigs, trucks, buckets, bulldozers, and conveyor-belt pulleys.

**V-Belts**—Manheim Mfg. & Belting Co., Manheim, Pa., Catalog describes features of Veebos adjustable V-belt and contains construction and installation details, engineering data and application photos.

**Welding Jigs and Fixtures**—Air Reduction Sales Co., 60 East 42nd St., New York 17. Reprint article (No. ADR-42), entitled "Jigs and Fixtures for Sheet Metal Welding," covers both metal-joining processes applicable to the sheet-metal field and simple jigs and fixtures and more complex jigging problems.

**Conveyor Belts**—B. F. Goodrich Co., Akron, Ohio. Catalog section on the Goodyear line of conveyor belts features a guide on the selection of grades needed for specific services.

**Earth-Moving Equipment**—Caterpillar Tractor Co., Peoria 8, Ill. Form No. 10,000, "CATERPILLAR Progress Through the Years," traces the evolution of the Caterpillar Tractor Co., reviewing the birth of heavy machinery and the strides taken to present today's efficient and productive equipment, with plans for the future.

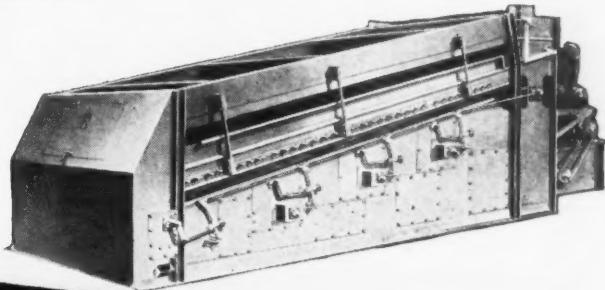
**Anthracite-Silt Preparation**—Humphreys Investment Co., First National

# SMART OPERATORS PREPARE THEIR COAL WITH MODERN EQUIPMENT

Run of mine coal can be broken down into several grades of marketable finished product—and it is a smart producer who extracts all possible grades from his mine output.

Proper coal cleaning

is the answer.



**R&S SUPER-AIRFLOW is New**

**Ideal for dry cleaning  
coal smaller than**

**ten mesh!**

**In combination  
with the Hydro-Separator and  
Hydrotator Processes, two other  
outstanding Roberts & Schaefer  
achievements, this process offers  
complete profit realization. Consult  
Roberts & Schaefer—coal cleaning  
specialists for over forty years.**

**ROBERTS and SCHAEFER CO.**

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# Simplified Dust Control

## COMPOUND M CARTRIDGE

### Solidified Concentrated "Wetting" Compound

Reduces dust by nearly 80% at the cutting machine, loading machine, rotary dump, and tipple.

Completely automatic, requires no motor, pump, or labor for operation. Gives positive proportioning. Guaranteed satisfactory or money refunded.



### IT PAYS TO USE COMPOUND M

- Reduces dust in the air, dust accumulations, and retrogression of rock dust.
- Increases visibility—aids production—cuts down accidents.
- Reduces use of water by about 75%—aids preparation—reduces possibility of freezing.
- Aids in preventing respiratory diseases — decreases absenteeism.
- Recommended by all safety codes.

### COST IS NOMINAL

Repaid many times by increased production, efficiency and safety. Used in hundreds of mines all over the world.

## THE JOHNSON-MARCH CORP.

Manufacturers of Chemical Products  
for Mining and Industry

52 Vanderbilt Avenue

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Representatives in All Centers

Cut and Mail This Convenience Coupon

Johnson-March Corp., 52 Vanderbilt Ave., New York 17, N. Y.  
Send me details on Simplified Dust Control.

Name..... Title.....

Address.....

City..... State.....

Bank Bldg., Denver 2, Colo. Bulletin No. 6, entitled "Preparation of Anthracite Silt for Boiler Fuel in a Humphreys Spiral Test Plant," reprinted from "Transactions of the Fifth Annual Anthracite Conference of Lehigh University," is a report on the operation at The Hudson Coal Co.

**Sewage-Disposal and Water-Works Blowers**—Roots - Connersville Blower Corp., Connersville, Ind. Bulletin No. 23-120-B10 covers various types of equipment for use in sewage-disposal plants and water works, with emphasis on rotary positive and centrifugal blowers for this use.

**Fans**—Jeffrey Mfg. Co., Columbus 16, Ohio. Catalog 797 provides complete information on Jeffrey Aerodyne fans, Jeffrey Aerodyne Junior fans and Jeffrey blowers, including specifications, capacities and typical installations. One section contains useful data on mine ventilation.

**Couplings**—Thomas Flexible Coupling Co., Warren, Pa. Catalog sheet contains specifications, horsepower ratings, suggested loads, etc., for the Type DBZ flexible couplings.

**Underground Communication**—Farmers Engineering & Mfg. Co., 549 Brushton Ave., Pittsburgh 21. Bulletin describes construction, operation and features of the Femco Trolley-Phone for underground communication to any moving or stationary location.

**Drills**—Salem Tool Co., Salem, Ohio. Bulletin illustrates and describes operation and features of horizontal and vertical types of McCarthy Rock Boring drills for strip-mine drilling.

**Insulated Pipe**—Ric-wiL Co., Cleveland, Ohio. Booklet contains specifications for underground-pipe distribution systems employing prefabricated insulated pipe conduit and includes construction details of Ric-wiL insulated-pipe units and available accessories. Also, additional Folder No. 4704 provides details on Ric-wiL tile and cast-iron conduit systems.

**Compressed-Air Cleaning**—Logan Engineering Co., 4901 Lawrence Ave., Chicago. Bulletin No. 147 details construction features, tests, and successful installations of the Aridifier as a positive remover of water, dirt, oil and scale contamination from compressed air lines.

**Silicone Insulation**—Dow Corning Corp., Midland, Mich. Silicone Data Sheet (No. B-30-1) lists recommended specifications for rewinding a.c. induction motors with silicone insulation.

**Floor Repairs**—Stonhard Co., 403 N. Broad St., Philadelphia 8. Folder describes speedy repairs to rough floors using Stonhard Stonfast, a material said to be ready for heavy duty service immediately after installation.

# Big-Truck capacity in small space

## WALTER 20-TON DUMPER

—plus positive 4-wheel traction for toughest conditions



THE WALTER 20-TON DUMPER brings you big-truck tonnage in a compact, fast, highly maneuverable back-dump truck of 12 cu. yd. capacity. And, having the great traction of the Walter 4-Point Positive Drive, it hauls these loads through soft dirt, deep mud, over slippery surfaces and steep grades—places ordinarily inaccessible for anything except crawlers.

The Walter 20-ton Dumper has many advantages in coal mining. In strip mining, you get high-

tonnage capacity on short runs and in congested areas, plus the convenience of back-dumping where required. In shaft mining, one mine is using a single Walter Dumper to handle the entire mine waste disposal job, eliminating four trucks previously used.

Other features include a 200 hp. diesel engine, three automatic locking differentials, tractor type transmission, suspended double reduction drive, scientific weight distribution, short wheelbase, hydraulic steering, powerful air brakes. Rugged chassis withstands heavy shocks. Write today for full details.



WALTER Tractors available from 125 to 350 hp.  
to haul any type trailer through difficult terrain.

**WALTER**  
**TRACTOR TRUCKS**

**BRONZE BEARINGS THAT ARE  
WORTH THEIR WEIGHT  
IN GOLD**



**AXLE BEARINGS  
JOURNAL LINERS  
BUSHINGS and  
WEARING PARTS**

For

**GENERAL ELECTRIC • GOODMAN  
WESTINGHOUSE • SULLIVAN  
OLDROYD • JOY • JEFFREY  
EQUIPMENT**

**A SPECIFIC FORMULA FOR  
EACH APPLICATION MAKES  
FOR LONGER LIFE**



**PROMET CASTINGS**

Any size, shape or section, up to 3,000 lbs. Pattern making, designing, machining.

**BAR STOCK**

Round, hexagon, square. Rough cast, semi-finished. Cored stock all sizes (by  $\frac{1}{8}$ " steps) from  $\frac{1}{2}$ " minimum core to 12" O.D. and 12" lengths. 6 grades of hardness.

**PROMET MINE  
SPECIAL BABBITT**

Lead base, all virgin metals, perfectly alloyed. Fine, velvety grain. Entire bearing surface wears uniformly, without pitting. Unaffected by moisture. Simply heat to 900°-950° and pour. Can be repeatedly remelted and reworked. Repouring only refines it. No appreciable shrinkage, hence better contact with supporting shell, a more solid, rigid bearing. In 10-lb. pigs.

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*Prompt deliveries can usually be made from stocks maintained at*

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**BIRMINGHAM, ALA.** B. B. Ladd, Birmingham Temperance Co., Phone Main 0-111  
**DETROIT, MICH.** Industrial Service, 1615 St. of State, Phone Main 0-111  
**DETROIT, MICH.** Detroit & American, 1101 Cass Ave., Phone 1-7915  
**WILLIAMSBURG, VA.** Williamsburg Supply Co., Phone 1200

**Steam Cleaning Machine**—White Engineering & Mfg. Co., Inc., 130 W. Passaic St., Rochelle Park, N. J. Folder describes the new Model No. 46B White vapor steam cleaning machine for cleaning trucks, automobiles, road and construction machinery, railroad and industrial equipment.

**Pyrometers**—Pyrometer Instrument Co., 103 Lafayette St., New York. Catalog No. 160 illustrates and describes in detail the new Pyro surface pyrometer.

**Industrial Notes**

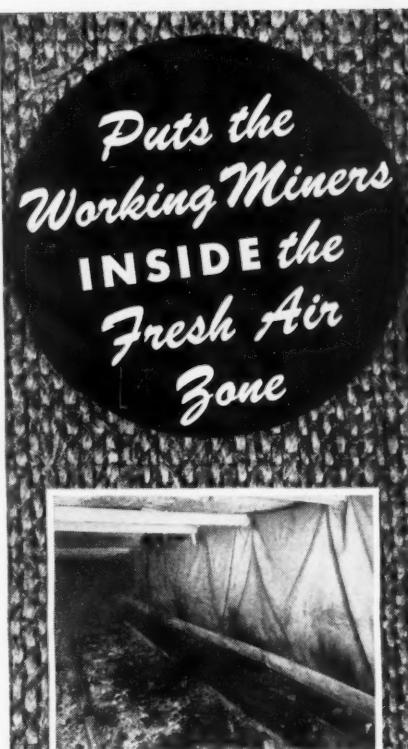
**Allis-Chalmers Mfg. Co.**, Milwaukee, Wis., has elected William A. Roberts and William C. Johnson executive vice presidents, respectively, of its tractor and general machinery divisions. Two new vice presidents also have been named for the two divisions, Marshall L. Noel, vice president and general sales manager for the tractor division, and J. L. Singleton, vice president and director of sales for the general machinery division.

**International Harvester Co.**, Chicago, has elected Giles C. Hoyt and Gen. Lewis H. Campbell, Jr., executive vice presidents. Mr. Hoyt, formerly vice president of foreign operations, joined Harvester in 1916 at San Francisco. Gen. Campbell, who came to the Harvester Company on March 1, 1946, shortly after his retirement from the Army, was previously vice president with responsibility for coordinating the company's expansion program.

Other changes in the company's top management also were announced. William E. Worth, formerly executive vice president, has retired after 27 years with the company. Robert P. Messenger, formerly vice president in charge of the farm implement division, becomes vice president in charge of foreign operations, succeeding Mr. Hoyt. Mr. Messenger is succeeded by Ralph C. Archer, formerly vice president in charge of the farm tractor division. Michael J. Graham, formerly assistant to the vice president in charge of manufacturing, has been appointed general manager of the farm tractor division, succeeding Mr. Archer.

**Air Reduction Sales Co.**, New York, has appointed H. C. Wallace manager of its Louisville district, succeeding R. S. Moore, recently deceased. Mr. Wallace joined Air Reduction in 1929 and since 1944 has been assistant manager of the district.

**American Car & Foundry Co.**, New York, has elected as president, Charles J. Hardy, Jr., formerly executive vice president, succeeding F. A. Stevenson, resigned. Mr. Ste-



An authoritative article on mine ventilation in Coal Age (December, 1946) states:

"Most miners work ahead of the crosscuts through which the fresh air current moves. Very little, if any, air moves in the average working place unless supplementary means are provided. . . . Line brattice is the best-known means of getting fresh air to working faces."

**ABC JUTE  
BRATTICE CLOTH**

is the time-proved material for directing the flow of fresh air to the men and for sealing off dead areas. It's made for rough handling, and is treated by our exclusive processes to resist flame, fungi, shrinkage and leakage. Two durable grades. Long service life makes ABC Brattice Cloth economical.

Where tubing is needed to assure ample fresh air at the faces, MINEVENT TUBING is the cost-cutting fungi and leak-proofed flexible blower pipe. Patented couplings and hangers facilitate installation. Made in three grades.

Let ABC convert your working faces into fresh air zones. Write for samples, or ask your ABC mine ventilation engineer.



A MESSAGE ABOUT ECONOMY TO MANAGEMENT

## Why Safety Goggles are a Worthwhile Investment for Management



Yield of Industrial Bonds  
Approximately **3%**



Yield of Common Stocks  
**4-7%**



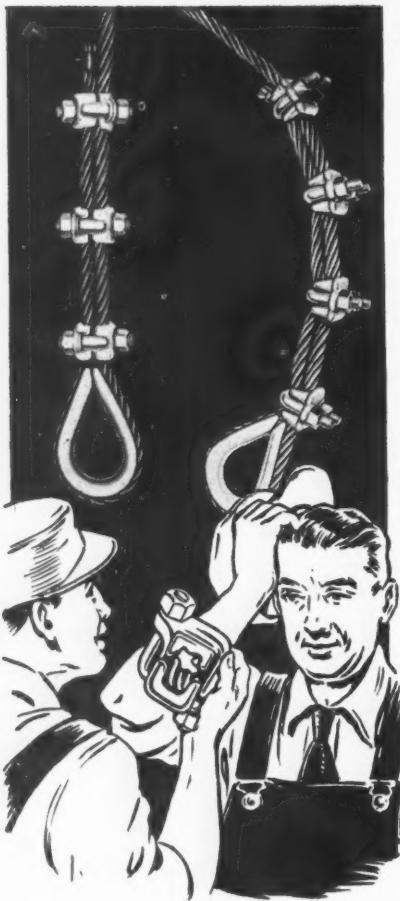
**“Yield” of  
SAFETY  
GOGGLES**  
that prevent 98% of Eye Accidents  
**233%**

Industrial eye accidents average \$5.00 per worker per year. Where else on an expenditure of \$1.50 (average cost of goggles) could you obtain a "return" of \$3.50—or 233% on your investment? Your M S A Representative has complete details about how an adequate eye protection program can cut *your* costs.

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SOUTHBRIE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



## "Get This Straight"

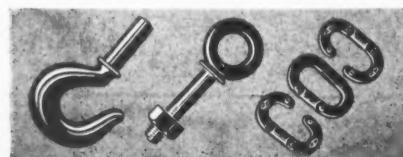
"A bowed rope is a weakened rope, Mac . . . those 'Finger Pinch' U-Bolt Clips crush and bend the rope . . . make the load uneven — some strands are overloaded . . . others don't carry their proper load. Results: premature rope failure . . . higher rope costs . . . lessened efficiency. Replace 'em with Laughlin 'Fist-Grip' Clips — they'll make your rope straight like *this* one, because their flat bearing surfaces give uniform pressure over the entire contact area. 'Fist-Grips' are easy to put on, too, Mac . . . even new men like yourself get 'em right the first time because they come in identical halves — you can't stagger 'em. Furthermore, three 'Fist-Grips' do the work of four U-Bolts, so you save time. Ask the Supply Room boys for 'Fist-Grips' . . . they prevent many a headache."

"Fist-Grip" Clips are available at your supply house. Look for the "L" trade-mark. Write for fitting catalog: Dept. 6, The Thomas Laughlin Co., Portland 6, Maine.

**LAUGHLIN**



THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS



venson had been associated with ACF for more than 40 years.

Ajax Flexible Coupling Co., Inc., Westfield, N. Y., has appointed Robert G. Cady manager of its materials-handling division.

Goodyear Tire & Rubber Co., Akron, Ohio, has named H. D. Foster manager of its mechanical-goods division, succeeding the late W. C. Wining. Sam DuPree, sales manager of Goodyear's molded-goods plant in St. Marys, Ohio, has been appointed assistant manager of the division. Mr. Foster, who has been associated with Goodyear for 33 years, has been Eastern sales manager of the division since 1941.

Four Wheel Drive Auto Co., Clintonville, Wis., has elected Robert A. Olen general manager of the company, a member of the board of directors, to succeed Charles Hagen, deceased. Mr. Olen joined FWD in 1924, working in the machine shop during school vacations.

Hewitt Rubber Division, Hewitt-Robins, Inc., Buffalo, N. Y., has appointed Marion D. Austin as assistant to Lester D. Bigelow in the Chicago office, to assist in field supervision. For the past three years, Mr. Austin has served as a district manager for Hewitt in Indianapolis.

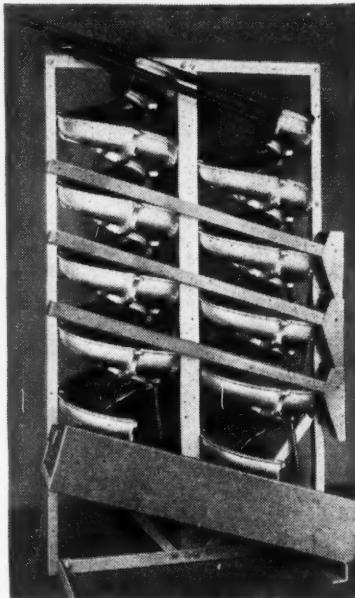
Beckwith Machinery Co., Pittsburgh, has named B. C. Landstrom, branch manager of the Beckwith office in Bradford, Pa., for the past two years, sales manager for the Pittsburgh territory. E. L. Mix, company salesman for 17 years in McKeon County, will succeed Mr. Landstrom in Bradford.

General Tire & Rubber Co. has appointed Frank H. Sibley, formerly assistant manager of the Chicago branch, St. Louis branch manager.

Jones & Laughlin Steel Corp., Pittsburgh, has announced several personnel changes. D. W. Thomas, manager of sales, tin mill products, and J. E. Timberlake, manager of sales, wire products, have been appointed assistant general managers of sales. S. A. Fuller, New York district sales manager, has been appointed manager, market-research department. Howard A. Knox, formerly assistant manager, has been appointed manager of sales, tin mill products. C. E. Kendall, assistant manager of sales, wire products, has been appointed manager of sales, wire products. D. J. Henecker, assistant manager of sales, wire products, has been appointed manager of sales, wire-rope products.

Ford Motor Co. has named C. J. Fournier manager of the company's parts and service department for the Southwestern region. Mr. Fournier, who has been supervisor of the service section of the central office parts and service department for the past

## HUMPHREYS SPIRAL CONCENTRATOR FOR CLEANING FINE COAL



LOW COST OF INSTALLATION  
NO MOVING PARTS  
LOW OPERATING COST

Engineering Division  
The Humphreys Investment Co.  
First National Bank Building  
DENVER 2, COLORADO



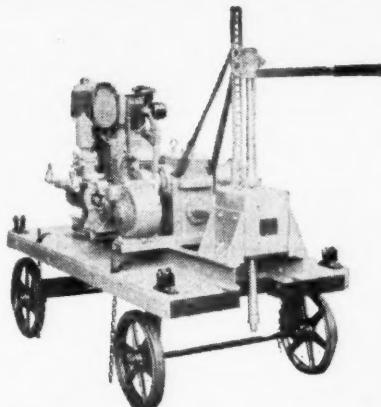
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Let our engineers work with you to maintain efficiency under any condition by diagnosing your trouble and prescribing the proper grade of brush.

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- Accurate cores of coal seams by using single or double tube core barrels.
- Ideal for determining overburden before strip mining.
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**HUDSON RUMSEY**  
CO. INC.  
1200 NIAGARA ST. BUFFALO, N.Y.

two years, will have headquarters in Kansas City, Mo.

Marlow Pump Co., Ridgewood, N.J., through Harris Pump & Supply Co., Pittsburgh distributors, has announced the appointment of the Beckwith Machinery Co. to handle Marlow Pumps to the construction and strip-mining industries.

Caterpillar Tractor Co., Peoria, Ill., has announced several personnel changes. E. W. Jackson, general parts manager since 1944, has been appointed director of parts and service. M. T. Deames has been promoted from assistant general parts manager to the general parts management; and W. Blackie, vice president and chief administrative head of the accounting and merchandise departments, also has assumed administrative guidance of the traffic department.

Barber-Greene Co., Aurora, Ill., has named Wayne D. Adamson advertising manager, succeeding John H. Dykstra. Mr. Adamson was formerly associated with the Illinois Institute of Technology, where he was editor of several publications, including the Illinois Tech Engineer.

Four Wheel Drive Auto Co., Clintonville, Wis., has established sales headquarters in the Masonic Bldg., Duncan, Okla., for its Southwestern sales region, including Oklahoma, Texas, New Mexico, Arkansas, Louisiana and Mississippi. Wm. C. Merrill was recently appointed sales manager of this territory. The M. B. Salisbury Co., Inc., Topeka, Kan., has been appointed FWD distributor for that portion of Kansas east of and including the Counties of Republic, Cloud, Clay, Geary, Lyon, Coffey, Allen, Neosho and Labette. Studer Tractor & Equipment Co., Casper, Wyo., has been named FWD distributor for that state.

Timken Roller Bearing Co., Canton, Ohio, recently opened a new branch plant in St. Thomas, Ontario, Canada. In expanding its operations to Canada, the Timken Co. states that it is seeking to offer better services to present and prospective customers in the Canadian markets. John Jolly is general manager of the new plant. Charles Wynn is assistant general manager and Jack McGinnis, production superintendent.

Olin Industries, Inc., has elected Fred Olsen, chief of research and technical development of its Western Cartridge Co. division at East Alton, Ill., since 1929, a member of its board of directors.

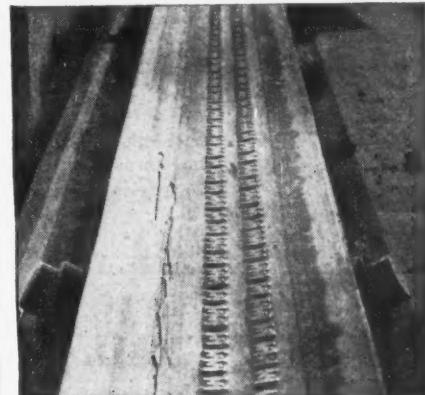
Joseph T. Ryerson & Son, Inc., Chicago, has appointed William G. Findley, associated with the company for 25 years, manager of its Pittsburgh plant, succeeding Howard L. Robinson, who has been given a special assignment at the company's Cleveland plant.

# CONVEYOR BELTS

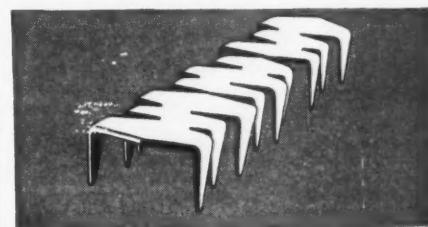
fastened or repaired

ON THE JOB

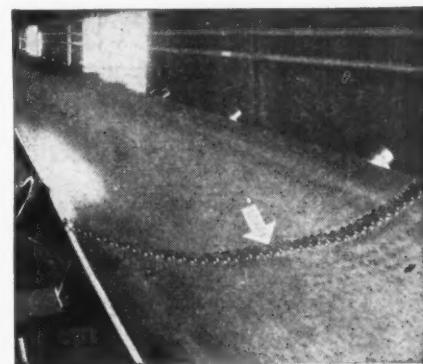
in a few minutes



All you need are hammer,  
block of wood and . . . .



**BRISTOL'S  
BELT LACING**



For rubber or woven conveyor  
belts up to  $1\frac{3}{16}$ " thick.

Write for Bulletin 736.

**THE BRISTOL COMPANY**

Mill Supply Division  
139 Bristol Road, Waterbury 91, Conn.  
DISTRIBUTORS EVERYWHERE

**Mining Safety Device Co.**, Bowers-town, Ohio, has announced the purchase of the entire business of Edelblute Mfg. Co., Reynoldsville, Pa. Edelblute's "Anchor" products will be made and sold by Mining Safety Device along with their own line of equipment. T. H. Edelblute, former owner of Edelblute, is now affiliated with Mining Safety Device in an advisory capacity.

**Salem Tool Co.**, Salem, Ohio, recently named the following companies as distributors for their coal-mining equipment: West Virginia Supply & Equipment Co., Clarksburg, W. Va.; W. W. Williams Co., Columbus, Ohio; A. T. Green Machinery Co., Pittsburgh, Pa.; Rish Equipment Co., Roanoke, Va., and Charleston, W. Va.; Diamond Supply Co., Evansville, Ind.; and O. D. Lindstrom Equipment Co., Birmingham, Ala.

**Bucyrus-Erie Co.**, South Milwaukee, Wis., has named two new distributors in Tennessee, the Industrial Tractor & Equipment Co., Inc., Nashville, and the Power Equipment Co., Knoxville.

**Allis-Chalmers Mfg. Co.**, Milwaukee, Wis., has transferred William D. Pretts, supervisor of passenger reservations in the traffic department, to the mining section of the firm's basic industries department.

**Atlas Tool & Designing Co.**, Philadelphia, has changed the name of the organization to the Atlas Chain & Mfg. Co., and is manufacturing a line of roller chains.

**New Departure Division, General Motors Corp.**, Bristol, Conn., has appointed F. W. Marschner, formerly Western sales manager at Detroit, administrative assistant to Milton L.

Gearing, recently named general manager of the division. George A. Smith, formerly assistant plant manager at Meriden, Conn., becomes general manufacturing manager. Seth H. Stoner has been named acting chief engineer during the illness of T. C. Delaval-Crow.

**Caterpillar Tractor Co.**, Peoria, Ill., has promoted J. M. Davies to associate director of research in administrative charge of the department, and R. C. Williams as assistant director of research in charge of tractor and earth-moving projects.

**International Harvester Co.** has announced a new two-reel, 22-minute, black and white, 16-mm. sound motion picture, "International Diesel Power," that illustrates the diesel's economy and maneuverability and adaptability to all types of working conditions, as well as its internal operation. Interested groups may secure the film from the Consumer Relations Department, International Harvester Co., 180 North Michigan Ave., Chicago 1.

**Falk Corp.**, Milwaukee, Wis., has appointed Henry W. Kayser supervisor of development engineering. Mr. Kayser has been associated with Falk as designer, application engineer and development engineer since 1931.

**All-State Welding Alloys Co., Inc.**, White Plains, N. Y., has appointed Richard T. Spear a regional sales manager for the territory of eastern Pennsylvania, south New Jersey, Virginia, West Virginia, Delaware, Maryland, and the District of Columbia.

**Link-Belt Co.**, Chicago, has re-established a sales office in Washington, D. C., at 1009 Washington Gas Light Bldg., with C. R. ("Pete") Heller, Washington representative, in charge. Mr. Heller will work with foreign purchasing commissions and governmental bureaus located in Washington.

**Dave Fischbein Co.**, Minneapolis, Minn., has appointed Bemis Bro. Bag Co., St. Louis, Mo., exclusive distributor for its new hand electric filled-bag closer.

**International Harvester Co.**, Chicago, has appointed R. G. Greer, formerly manager of the Louisville, Ky., general line branch, assistant Eastern district manager, motor truck division. R. H. Currill, formerly retail manager at Burlington, Vt., has been appointed assistant manager at Harrisburg, Pa., motor truck branch.

**Euclid Road Machinery Co.**, Cleveland, Ohio, has appointed Euclid-Chicago Co., 201 North Wells St., Chicago 6, Euclid distributor for northwestern Indiana, northern Illinois, and southern Wisconsin. The company, which will handle Euclid equipment exclusively, is headed by Robert M. Jones and Horace K. Church.

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can save you money—by  
saving TIME . . . never  
more important than it is  
today!

# 10 years on an ACID WATER diet!



THIS TRANSITE PIPE DRAINAGE LINE withstood corrosive mine water for ten years at the Preston County Coke Company's Cascade, W. Va., mine.

## Another Transite Pipe drainage line meets the "acid test"

PASSING THE "ACID TEST" is the toughest job of a mine drainage line. Yet—this Transite Pipe handled corrosive acid mine waters at the Cascade, W. Virginia, mine of the Preston County Coke Company for ten long years! Recently, when the line was discontinued due to changing operations, the pipe was still in excellent condition and good for additional service.

This is not an unusual service record for Transite Pipe. That's because it is made of asbestos and cement by a special process—has exceptional resistance to corrosion. Many operators who have specified Transite now figure the life of their drainage lines in years rather than months. Furthermore, Transite's long life may be utilized in different locations as the need arises . . . for this modern pipe can be easily salvaged.

**For Other Types of Mine Service, Too.** Draining acid mine waters is only one of many ways Transite saves money for coal operators. For water supply lines, Transite offers the advantage of an unusually high

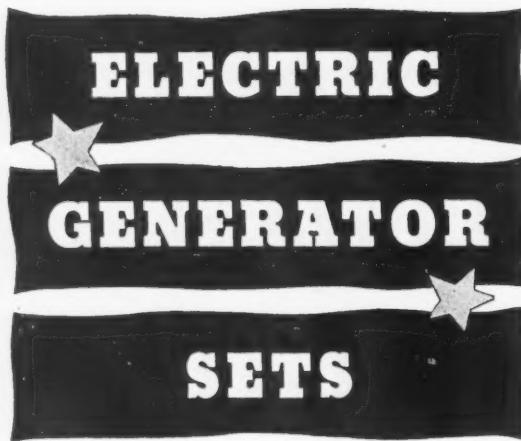
carrying capacity—helps assure low pumping costs and maximum pressures. For fire prevention ducts . . . for spray and return lines from condenser cooling towers and for many other services where a tough, durable, easily installed pipe is required—Transite provides important economies.

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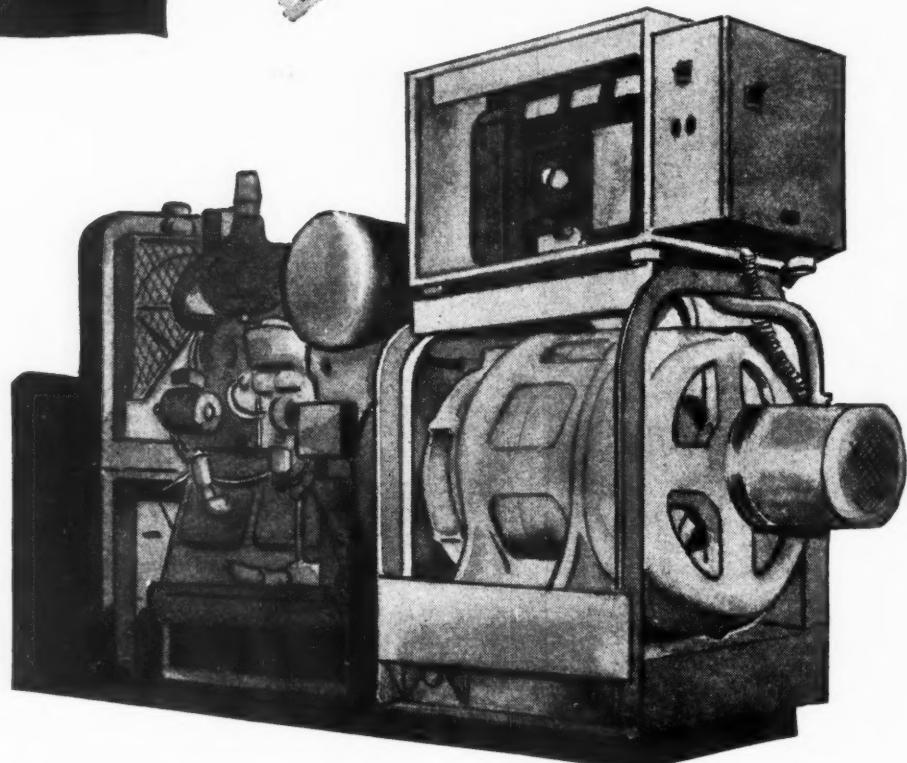
A new brochure, "Transite Pressure Pipe for Mine Service," gives full details about this asbestos-cement pipe . . . tells how Transite can help you eliminate frequent replacements and reduce pipe line costs. Write Johns-Manville, Box 290, New York 16, N. Y., for your copy.



# Johns-Manville TRANSITE MINE SERVICE PIPE



25KVA



*now offered on*

### **COMPETITIVE SEALED BID SALE**

These are single-phase, 60 cycle, 120 volt, 900 R.P.M. generator sets. Power-full, long-lived, these units are ideal as stand-by power wherever continuity of power is a necessity. They are gasoline engine driven but are readily adaptable to operation on natural gas.

Here are the power plants for service in construction camps—gas and oil drilling units—mining locations—logging camps—and as stand-by units in industry.

The inventory is located in Baltimore where arrangements may be made for inspection. For full information concerning this sale and complete data on available generators, write to the Baltimore or Richmond Regional Offices, or visit your nearest Customer Service Center.

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Your business is solicited. Much material which is surplus in the United States is urgently needed or is readily salable in other countries. Watch for other offerings; many of them may be of interest to your clients.

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# SIMPLEX JACKS

through THICK or THIN

## FOR THICK SEAMS



The Simplex No. 86A (5-tons), is 20" in height and has a 13" lift. It is the ideal jack for moving and adjusting cutting machines, conveyors and loaders, etc., wherever headroom permits the use of a jack of this size. It is speedy, rugged, and includes such vital safety features as Simplex double lever sockets, extra strong springs and links, short fulcrum centers, etc.



## FOR MEDIUM SEAMS



The Simplex No. 85A (5-tons) is 17" in height and has a 10" lift. It provides all the efficiency and safety features of the Simplex No. 86A for locations where more limited height and lift are required. It combines maximum strength, minimum weight, wide concave rack bar toe lifts, large trunnion bearings, strong pawls and reinforced inner-ribbed housings.



## FOR THIN SEAMS



The Simplex No. 84A (5-tons) is 14" in height, has a 7" lift and weighs only 28 lbs. It is designed and constructed for easy handling and use in cramped quarters. This efficiency has been achieved without sacrifice of any of the safety features that have made Simplex Jacks outstandingly popular wherever coal is mined.

Every one of your machines should carry a Simplex Jack of proper size for most efficient operation on the seam being worked. Send for Bulletin—Mines 46.

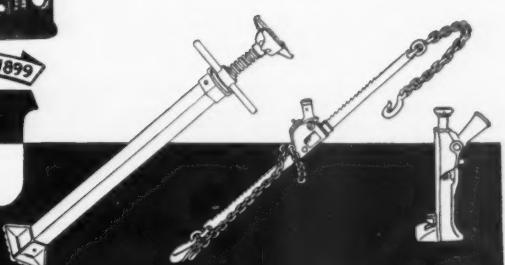
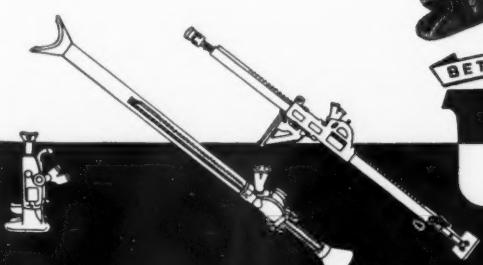


• No. 185 (5-tons) Height 17", lift 10". Lifts at right angle to operator on auxiliary shoe.

(10-tons) Height 17", No. 1017 lift 9 1/4". For working medium seams. Answers the demand for a light weight, heavy capacity jack for modern heavy mining equipment.



**Simplex**  
LEVER - SCREW - HYDRAULIC  
**Jacks**



**TEMPLETON, KENLY & CO.**

1040 South Central Avenue, CHICAGO 44, ILLINOIS

## STOCKPILES WORKED FASTER with LESS LABOR with SCOOPMOBILE

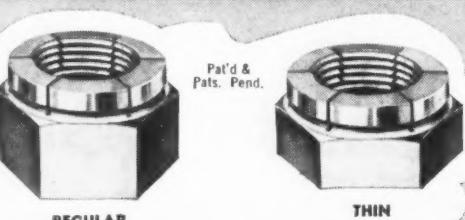
With a level bucket load capacity of 1.08 cubic yards, SCOOPMOBILE can easily load up to 30 tons of stock-piled coal an hour. Can discharge 4,000 pounds up to  $7\frac{3}{4}$  feet with standard track. Extension raises discharge height to  $17\frac{3}{4}$  feet. Attachments include lift forks, crane boom, concrete hopper, etc.

Write Dep't CA for complete information.

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### SELF-LOCKING NUTS

"Flexloc" is of one-piece construction, available in U.S.S. and S.A.E. thread series and can be made in such metals as Steel, Stainless Steel, Brass, Bronze, etc. Every thread—including locking threads—takes its share of the load. "Flexloc" accommodates itself to a very wide range of thread tolerances . . . can be used over and over again without losing much of its locking torque . . . is not affected by temperatures likely to be met within the field of Mechanical Engineering . . . being a "stop" nut, it stays locked in any position on the threaded member.

It is made by the manufacturers of the unexcelled "Unbrako" Socket Screw Products—guaranteeing quality. Sizes from #6 to 1" in diameter—in both "regular" and "thin" types (shown above).

Millions of Flexlocs now in use.

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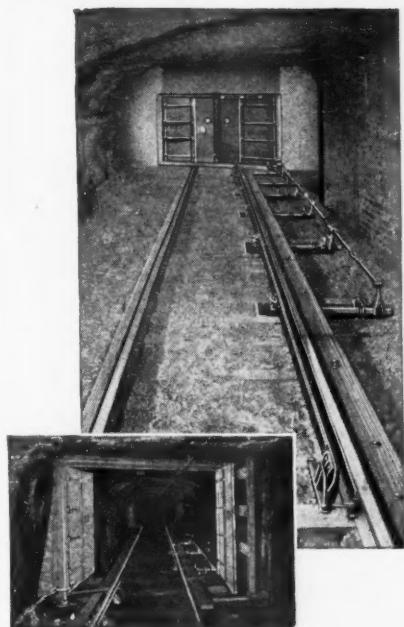
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Save TIME  
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SERVICING  
COAL MINES

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for COAL or ORE Mines. Control ventilation. Requires no attendant and little attention. Opens in a split second—closes quickly. On duty three shifts every day. Reversing air does not affect door. Can be operated against high air pressure. No experiment. Thousands in use. Many in constant service more than twenty years. PAYS FOR ITSELF IN LESS THAN A YEAR.



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Does everything a man can do and does it better. No stops. No delays. Signal lights indicate direction of switch points. A WORTHY SAFETY DEVICE. Signal lights indicate if switch is blocked, or points are split. Prevents wrecks. Trains run through switches at normal speed. Expedites transportation. As a DE-RAILER against run away cars or trains IT HAS NO EQUAL. Send for Catalog.

THE AMERICAN MINE DOOR COMPANY

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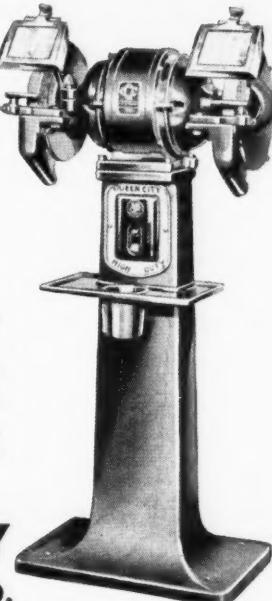
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It takes a top-quality grinder to stand up under the heavy work that pours through a mine maintenance shop. Queen City Grinders are noted for their durability, freedom from downtime, and dependable performance.

Illustrated is a Heavy Duty Queen City Floor Grinder equally adaptable to fine or heavy work. Has numerous safety and operating features. Send for catalog complete with prices and details.

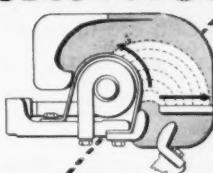
**QUEEN CITY  
MACHINE TOOL CO.**

215 E. 2nd St.  
Cincinnati 2, Ohio

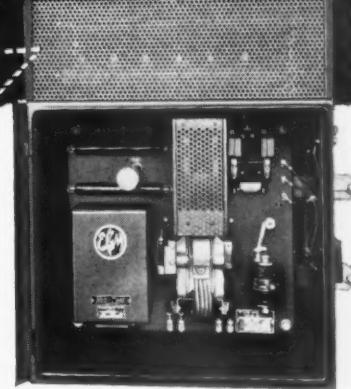


Agents in  
Principal cities

## HOW TO LIMIT Shutdowns



LINE-ARC design removes the arc from tips in 1/500 sec., centers it between the arc shields. Assures consistent opening of the power circuit.



## USE EC&M LINE-ARC SECTIONALIZERS

THESE are sturdy units using a heavy-duty magnetic contactor of LINE-ARC design to open and close the power circuit.

With the overcurrent relay adjusted to the requirements of a stub-end feeder or similar section of the power circuit, protection is accurate and quick against roof falls, overloads, or short circuits.

And when the line is clear (free from trouble), they automatically reclose after an electronic time-delay, adjustable from 2 to 22 seconds.



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## in this "7½ billion-a-year" success?

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Your continued support in promoting the Payroll Savings Plan will help "America's partnership" this year to repeat or surpass last year's four-star performance, in which sales of Savings Bonds were 7½ billion dollars—*exceeding redemptions by far more than a billion!*

So keep up the splendid work—keep on telling and selling your employees the advantages of Payroll Savings: (1) ease; (2) regularity; (3) safety of investment; (4) security for the individual and the nation; (5) \$4 for every \$3 at maturity! And, remember, people with a stake in the future are the most stable, most productive employees.

For any help you need in conducting the Plan, call on your State Director of the Treasury Department's Savings Bonds Division.

New  
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THE Treasury Department and the banks of America are making it possible for farmers, doctors, and other self-employed people to participate in "automatic" Bond buying by special arrangement with their banks. This extension of the Savings Bonds program is not a partial payment plan and is intended *only* for people who are not in a position to take advantage of the Payroll Savings Plan.

*The Treasury Department acknowledges with appreciation the publication of this message by*

**COAL AGE**



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HD BELT FASTENERS



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**FLEXIBLE STEEL LACING COMPANY**  
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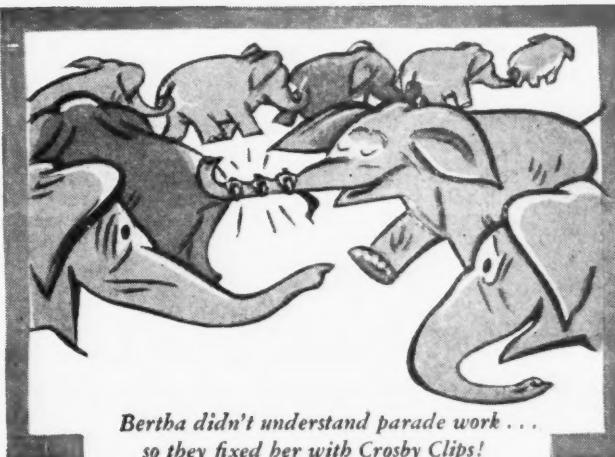
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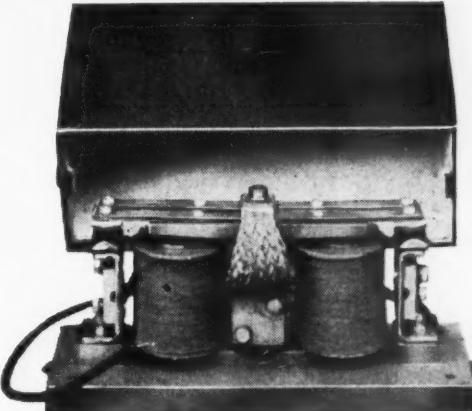
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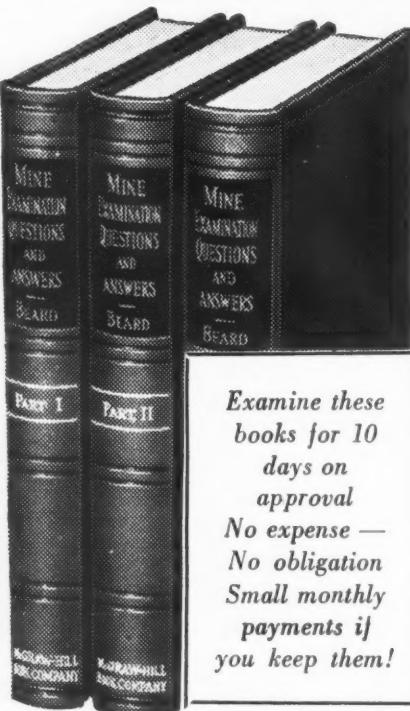
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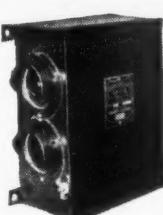
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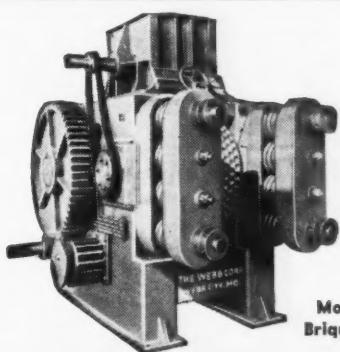
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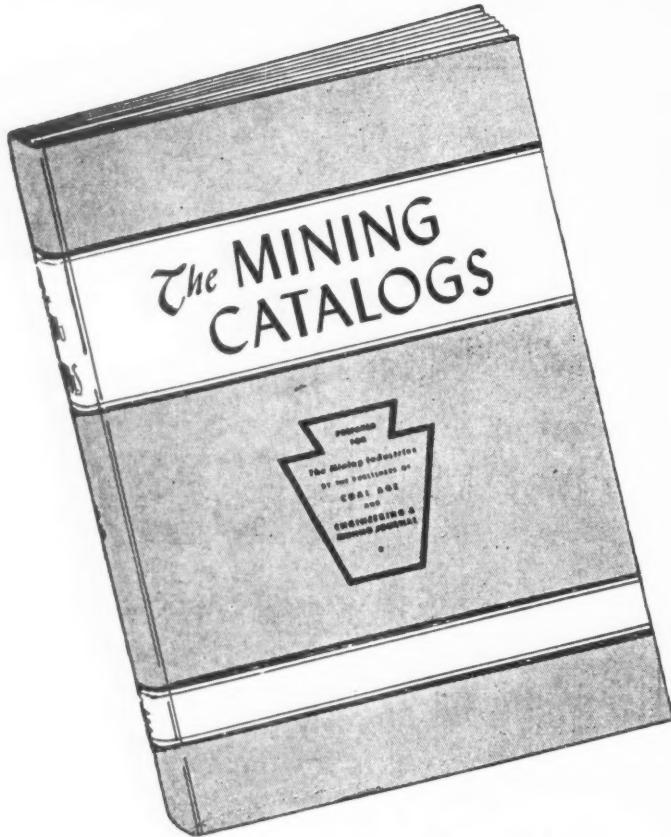
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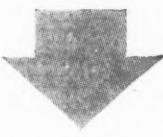
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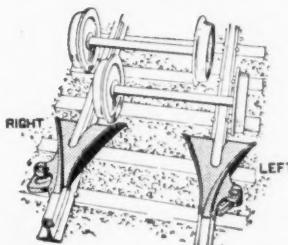
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**Sullivan:** CE7, CE9 and CE10.

## OTHER ITEMS AVAILABLE

### Dumps.

### Field Frames.

**Generators:** DC 250-275 volt. 30 KW to 100 KW.

### Hoists.

**Hoists:** overhead, AC 3-60-440 1 ton and 2 ton.

**Lathe:** 48" x 14" with Taper Attachment and 3-60-220 Motor.

### Lathe, Switches.

**Loading Machines** and Goodman Shaker Conveyors and Duckbills.

### Milling Machines

horizontal and vertical.

### Mine Cars.

### Mining Machine Trucks.

### Motors.

**Motor Starters and Controllers:** AC and DC.

**Plants:** 50 KW Westinghouse 55 KVA Rotary Transformers. Voltage 23100/208. Synchronous Motor Starters, full Magnetic Across-the-line, 3 phase, 60 cycle, 150 Volts—2-2-H.P. and 6-250 H.P. Westinghouse.

### Pumps.

### R. R. Switches:

85± to 100±.

### Shaker Conveyors

and duckbills.

**Slate Larry:** 2-5BU on Cats. 2—Myers-Whaley, #3 and #4.

**Spare Motors:** DC and AC for mining machines and locomotives.

### Switchboards.

### Speed Reducers.

### Transformers.

**Welders:** AC 220/440 volts, 350 and 400 amp.

# GUYAN MACHINERY COMPANY,

Logan, W. Va.

## SYNCHRONOUS

### ROTARY CONVERTERS

Qu.	KW	Make	Speed	D.C.V.
1	500	Whse.	1200	600
1	300	Whse.	1200	275
1	300	Whse.	1200	600
1	300	G. E.	1200	600
1	175	Whse.	1200	275
1	175	G. E.	1200	275

### TRANSFORMERS

1-200 KVA Kuhiman, Cont. Duty, Auto. 3800-2300/3/60.  
 3-37½ KVA Pitts. Cont. Duty, Auto. 6900-2300/1/60.

## MOTORS

1-80 HP. 1200 RPM, Cr. Wh. 220/440/3/60 Ind.  
 1-75 HP. 1800 RPM. U. S. Line Start 220/440/3/60 Ind. B.B.  
 1-65 HP. 1200 RPM. G. E. type KT. 220/440/3/60 Ind.  
 1-40 HP. 900 RPM, Whse. type CW. 440/3/60 Slip Ring.  
 5-5 HP. 2200 RPM. Reliance Ex. Proof. 230 V. D.C.  
 Several Whse. type SK. 230 V. D.C.  
 5, 7½, 10 and 15 HP. New TEFC and standard open ball bearing AC motors available.  
 Across line and reduced voltage starters.

# Electrical Equipment

Converters, Motor Generator Sets, A. C. & D. C. Motors, Control Equipment and Transformers. We build equipment to fit your requirements. Over 25 years engineering background.

## MOTOR GENERATOR SETS

1-150 KW. Ridgeway, 900 RPM, 250 V. DC to 225 HP. 2300 volt. Syn. motor AC, complete with control equipment.  
 1-200 KW. 900 RPM, 250 V. DC to 300HP, 2300/4000 volt, Syn. motor AC, complete with control equipment.

**C. B. LOCKE CO.**  
 P. O. BOX 3227  
 TEL. 38-136  
 CHARLESTON, W. VA.

**NEW and REBUILT**

## CUTTING MACHINES

1-CE-7 Sullivan with or without truck.

## SUBSTATIONS

1-Armature and stator for 150 KW Ridgeway.

7-Westinghouse 300 KW Rotary Converters, 6 phase, 60 cycle, 300 or 600 volt. DC. 500 Amps. 1200 RPM, complete with switchboard panels.

## HOISTS

3-50 HP All Steel Hoists.

## MISCELLANEOUS

2-Jeffrey Crab reels, electric driven, 250 volt.  
 1-35-HP Cargo winch complete with 230 volt D.C. Motor.  
 1-62.5 KW Reeves Natural gas engine with 62.5 KVA G.E. alternator, 220 volt with complete switchboard equipment.  
 1-Westinghouse crab reel, electric driven, 250 volt.  
 2-500 volt Goodman 212-AA cutting machine armatures.

**A.C. and D.C. Stationary Motors, Starters, Transformers and Miscellaneous mine supplies.**

*We solicit your inquiries*

**ALL-STATE EQUIPMENT CO.**

LOGAN, W. VA.

Phone 884

## REBUILT MINING MACHINES

6-112 AA and 12 AA Goodman 250 Volts  
 1-112 G3A Goodman 222 Volts  
 2-12 A and 12 AB Goodman 250 Volts  
 4-CE 7 Sullivan A-C and D-C  
 2-7-B Sullivan 250 Volts

## LOCOMOTIVES

1-6 ton Goodman Type 33 250 Volts  
 1-6 ton Goodman Type 30-13 250 Volts  
 2-6 ton Goodman Type 2600 250 Volts  
 1-8 ton Westinghouse Type 906L 250 Volts  
 1-6 ton GE Trolley and Battery combination  
 1-12 ton GE Ball Bearing 42" gauge 250 Volt

## LOADING MACHINES

2-7 BU Jays 250 Volts 42" gauge  
 4-5 BU Jays 250 Volts 42" gauge

**THOMAS GILLESPIE & SON**

State Road 67, BICKNELL, IND.  
 Phones 179 and 149-K

# REBUILT EQUIPMENT—READY TO SHIP

## MOTOR GENERATOR SETS—250 V. D.C. (Motors 220/440 or 2300 V. 3 ph. 60 cy.)

No.	KW.	Make	Speed	15	30	47	1	West.	1140	CD
2	15	West.	1150	6	1	West.	1725	CD		
1	20	West.	900	18	1½	West.	1725	CD		
2	40	West.	850	17	1½	West.	1180	CD		
5	50	West.	1200	14	1½	West.	900	CD		
2	75	Star	1200	23	2	West.	1725	CD		
2	75	G. E.	600	26	2	West.	1150	CD		
4	100	Star	1200	20	2	West.	850	SK-23		
1	150	G. E.	1200	20	3	West.	1725	CD		
1	150	Cr. Wh.	720	25	3	West.	1150	SK-23		
1	200	Elliott	1200	15	3½	West.	850	SK-30		
1	200	Cr. Wh.	720	20	5	West.	1800	SK-20		
				44	5	West.	1150	SK-30		
				20	5	West.	850	SK-43		
				15	7½	West.	1750	SK-33		
				16	7½	West.	1150	SK-43		
				10	7½	West.	975			
				6	7½	Cr. Wh.	875	CCM		
				8	7½	West.	850	SK-60		
10	10	West.	1150	4	10	West.	1750	SK-43		
11	15	West.	1400	10	10	West.	1150	SK-60 & 63		
3	15	West.	1150	15	10	West.	850	SK-70		
2	20	West.	1400	14	15	West.	1150	SK-83		
3	20	West.	1150	3	15	Reliance	1150	66-TF		
5	25	West.	1400	2	15	West.	900	SK		
4	25	West.	1150	1	20	G. E.	3500	CD		
3	40	West.	850	4	20	West.	1750	SK-83		
5	50	Louis Allis	1150	2	20	West.	1150	SK-93		
4	75	Star	1150	3	20	West.	900	SK-100L		
5	100	Star	1200	5	20	West.	975			
3	125	Star	1150	5	25	West.	1150	SK-103		
1	175	Cr. Wh.	720	2	25	West.	850	SK-120		
1	200	Cr. Wh.	720	1	25	West.	600	SK-130		
1	200	Elliott	1200	3	55	West.	650	SK-121		
1	300	Sturtevant	425							
2	300	West.	225							

## ENGINE GENERATOR SETS

2—10 KW. 125 v. DC 1200 rpm. dir. con. Hercules Diesel Engines.  
2—30 KW. 125 v. DC 1500 rpm. dir. con. Buda Lanova Diesel Engines.  
1—35 KVA 220/440 v. 3 ph. 60 cy. dir. con. Ridgway Steam Engine.  
1—125 KVA 240/480 v. 3 ph. 60 cy. West. dir. con. to Erie Ball Engine.

## D.C. MOTORS — 230 Volts

No.	HP.	Make	Rpm	Type
20	½	West.	1750	CDH
12	¾	West.	1750	CD
18	¾	Wagner	1725	—

# DUQUESNE ELECTRIC & MFG. CO., PITTSBURGH [6], PA.

## FOR SALE

### CRUSHERS

1—Stephens Adamson 30x30 double roll crusher. Will crush from 20" down to 1½".  
1—Link Belt 30x60 double roll crusher, equipped with gear drive.  
2—McNally Pittsburgh 24x30 single roll crushers.  
1—American Pulverizer crusher #1627. Type AC, machine number AC3B, crushes from 20" down to ½".  
1—Jeffrey 24x24 single roll crusher. Serial #1798. Flat pulley driven.  
1—McNally Pittsburgh 24x24 double roll crusher. Serial #RH39067776.  
1—Link Belt, 20x20 double roll crusher.

### FAN

1—Bayley #17. Plexiform fan. Type F. wheel diameter, 93½", circumference, 24.478 ft. outlet area, 39.376 sq. ft. Capacity ranges from 39.376 CFM at outlet velocity of 1,000 to 141,759 CFM at outlet velocity of 3,600.

### LOCOMOTIVES

1—4-ton Goodman locomotive. Type 75AO4T, #5050, overall length 15'10", width 47", height 32", wheelbase 44" gauge 28". Gauge can be changed to 24", 36" or 42". Ball bearing motors and journals, 250 volts, DC, continuous strip grids, equalizers and spring bumpers.  
1—5-ton Goodman locomotive type W12A5, #983, overall dimensions, length 11', height 30", width 47", wheelbase 31", 42" gauge.  
1—6-ton G.E. locomotive, classification LM2T6MM5—serial number 5837, 250 volts DC, 36" gauge, 45" wide overall, height 33", overall height 38½", wheelbase 44", 30" wheel diameter, overall length 13', R86E type controller.  
1—6-ton Goodman locomotive #4976, type 13314T, 250 volts, ball bearing motors, 42" gauge, 44" wheelbase, overall length 14', overall width 54", height 35½".  
1—6-ton Goodman locomotive #3652, type 32AO4T, 250 volts, ball bearing, 36" gauge, with 6 extra new tires.

### MINING MACHINES

1—Sullivan CLE5, AC longwall mining machine, 3 phase, 60 cycle, 220 volts complete with cable.  
2—Sullivan type CH8, AC longwall mining machine, 3 phase, 60 cycle, 220 volt, 30" cutter bars, complete with 300' each of 3 conductor mining machine cable.  
1—Sullivan CET, AC shortwall mining machine, 3 phase, 60 cycle, 220 volts, 44" gauge, 6½" cutter bar. Complete with tip turn trucks.  
6—Goodman type 512DG3A, AC shortwall mining machines. Complete with cable and jacks. 8' cutter bars. No trucks.  
2—Jeffrey 35BB, AC shortwall mining machines. 6' cutter bars, complete with tip turn trucks, cables and reels.  
1—Goodman Universal 112AA, AC shortwall mining machine, 3 phase, 60 cycle, 220 volts, 6' cutter bar. Complete with cable and reel.  
1—Sullivan shearing machine type CH11, 250 volts DC, 42" gauge, 7½" cutter bars.  
1—Sullivan shearing machine type CH11, AC, 3 phase, 60 cycle, 220 volts, 36" gauge, 7½" cutter bar.

### MOTOR GENERATOR SETS

1—200 KW Westinghouse motor generator set direct current generator #201, type SK, compound wound, 200 KW, 275 volts, field serial number 1468087, direct connected to Westinghouse AC motor, 290 HP, 2,200 volts, 3 phase, 60 cycle, 606 amps, 900 RPM, serial #1351266. Complete with hand switchboard for AC and DC ends.

### BELT CONVEYOR

1—Type 97-C-30 belt conveyor (Goodman) 1,250' long complete.

### HOISTS

All types and sizes of hoists with and without motors.

### PUMPS

All sizes and types of pumps.

We are distributors for John A. Roebling's Sons Company wire rope and fittings.

**GAVENDA BROTHERS**  
CANTON, ILLINOIS

# FOR SALE

## LOADING MACHINES

8-11-BU Joy, 250 volt DC, 42" gauge.  
5-8-BU Joy, 250 volt DC, 42" gauge.  
5-7-BU Joy, 250 volt DC, 42" gauge.  
7-L-400 Jeffrey, 250 volt DC, 42" gauge.  
3-#3 Myers-Whaley, 250 volt DC.

## MINE CARS

200-3-ton all steel end dump, 27" high, 42" gauge, Timken roller bearing.  
500-4-ton rotary dump, 42" gauge, Timken roller bearing.

## LOCOMOTIVES

3-13-ton Goodman, type 136-B, 250 volt DC.  
2-13-ton Westinghouse, type 908-C, 250 volt.  
8-6-ton Goodman, type 33, 250 volt DC.  
6-6-ton G. E., type HM-250 volt DC.

## CUTTING MACHINES

5-29-LE Jeffrey, 250 volt, track cutters.  
4-35-B Jeffrey, 250 volt DC, 42" gauge.  
15-112-AA Goodman Universal, 250 volt, on tip-turn trucks, cable reel and cable.  
8-7-B Sullivan Shortwall, 250 volt, on tip-turn trucks.  
10-Jeffrey 24-L, 250 volt, permissible type longwall. Five years old.  
6-12-CC Goodman Shortwall, 250 volt DC.

We will soon have to offer all the equipment from a 5000-ton mine, including Motor Generator Sets, Rotary Converters, Steel Tipple, Electric Hoists, Mine Cars, Copper wire and Rail. Other items too numerous to mention.



Frank J. Wolfe

We specialize in buying complete mines that are going out of business or from receivers in bankruptcy, administrators of estates, etc.

## SPECIAL LAST MINUTE SHIPMENT

## LOCOMOTIVES

3-8-ton Jeffreys, type MH-100.  
4-8-ton G.E., type HM-822.  
5-10-ton G.E., type HM-830.  
All very late type series—250 volt, D. C.

## SYNCHRONOUS MOTOR GENERATOR SETS

1-200 KW, G.E., 250/275 volt, 2300 volt A.C. Complete with all necessary automatic switchboard and switchgear.  
1-150 KW G.E.—same as above.

# COAL MINE EQUIPMENT SALES COMPANY

306-7 BEASLEY BUILDING

L. D. Phone-34

TERRE HAUTE, INDIANA

## COAL CUTTING MACHINES

1-35B Jeffrey Shortwall, 250 V. D.C.  
1-35B Jeffrey Shortwall, A.C.  
2-29 Jeffrey Arcwall, 250 V. D.C.  
1-124 E. J. Goodman Slabbing, 250 V. D.C.  
1-36B Jeffrey Longwall, 250 V. D.C.  
1-12G3 Goodman Shortwall, A.C.

## LOCOMOTIVES

1-3½-Ton Trolley Locomotive.  
1-5-ton Goodman with 2 type 41, 250 V motors.  
1-5½-ton Ironton Storage Battery Locomotive.  
1-6-ton Jeffrey with MH 88, 250 V motors.  
1-6-ton G.E. Storage Battery Locomotive with 2HM825 motors.  
2-15-ton G.E., 250 V.

## ELECTRIC MOTORS

1-400 HP Allis-Chalmers SC 3/60/2200/1150.  
1-250 HP G.E. Slipring, 3/60/2200/600 RPM.  
1-200 HP Westinghouse, type CW slip ring, 3/60/2200/514 RPM.  
1-200 HP G.E. Synchronous Motor, 3/60/2200/1720.  
1-185 HP Burke SC 3/60/2200/1150.  
1-150 HP G.E. Squirrel Cage, 3/60/900.  
1-125 HP G.E. Squirrel Cage, 3/60/900.  
2-100 HP Ridgeway 2 speed Squirrel Cage Motors, 720/360 RPM, 3/60/2200 V.  
1-100 HP Synchronous Motor, 3/60/410/600 RPM.  
1-100 HP G.E. Squirrel Cage, 3/60/720.  
1-40 HP G.E. Squirrel Cage, 3/60/900.  
1-40 HP Westinghouse Squirrel Cage, 3/60/1800, 3/60/1800.  
1-25 HP G.E. Squirrel Cage, 3/60/720.  
2-15 HP Westinghouse Squirrel Cage, 3/60/900.  
1-7½ HP G.E. Squirrel Cage, 3/60/1800.  
1-5 HP Westinghouse Squirrel Cage, 3/60/1800.

## TRANSFORMERS

3-333 KVA Westinghouse 22000 V. to 230 V.  
3-150 KVA G.E. 1/60/2300 to 575 V.  
1-100 KVA 3/6900/220/440.  
1-50 KVA Westinghouse 1/60/2300/230/440 V.  
1-37½ KVA Pittsburgh 1/60/2300/220/440 V.  
2-25 KVA 1/60/2300/230/440.  
1-15 KVA 1/60/2300/220/110 V.

## COAL CRUSHERS

1-36" x 36" Jeffrey S.R. Coal Crusher, gear drive.  
**TIPPINS MACHINERY COMPANY**  
PITTSBURGH 6, PA.

## LOCOMOTIVES

American and Lima 80 ton steam switching locomotives new 1944. Type 0-6-0, 6 wheel equipped with tender. Engines are of the latest construction in like new condition, available at very attractive price. Specifications available. Also have several diesel and gasoline locomotives available from stock.

## MISSISSIPPI VALLEY EQUIPMENT CO.

511 Locust St. St. Louis, Mo.

## AIR COMPRESSORS:

12-Belted 380, 670, 870, 1000, 1300 ft.  
12-Diesel 105, 315, 520, 676 & 1000 ft.

6-Electric 1300, 1500, 2200, 5000 ft.

## CARS & LOCOMOTIVES:

100-50 ton cap. Gondolas.  
35-50 ton cap. Flat Cars.  
4-35 & 65 ton Diesel Locomotives.

6-10, 16, 20 & 30 ton Gas Locomotives.

150-8000 & 10000 gal. cap. Tank Cars.

20-12 yd. std. ga. Steel Dump Cars.

1-50 ton G.E. Diesel Elec. Locomotive.

## RUBBER CONVEYOR BELTS:

1000', 80', 60', 30', 300', 20', 1000', 42', 900', 48', 1450', 36', 1200', 24', 900', 18', 600', 16', 350', 14'.

## ELECTRIC LOCOMOTIVES:

15-3, 5, 8 ton Battery & Trolley.

## DIESEL GENERATORS:

12-100, 150, 180 & 480 KW.

## MINE LOADERS:

17-QD9, Elmco 21, Conway 20, 50, 60 & 75 and Sullivan HL3.

## STEEL TANKS:

30-8000, 10,000 & 20,000 gallon capacity.

## SHOVELS — DRAGLINES:

7-1 yd., 1½ and 2 yd. Gas & Diesels.

16 yd. Elec. 180 ft. Boom Dragline.

**R. C. STANHOPE, INC.**  
60 E. 42nd Street New York 17, N. Y.

**NORTHWEST NO. 8 DRAGLINE** with 2-yd. Dragline Bucket. Powered by 6 cyl. Wisconsin gasoline engine. Now used in coal stripping.

**IRON & STEEL PRODUCTS, INC.**  
1348 S. Brainard Ave., Chicago 33, Illinois  
"ANYTHING containing IRON or STEEL"

## HIGH GRADE TOOLS

2½" Bar Cleveland Horiz. Boring Mill.

3" Bar Universal Horiz. Boring Mill.

3" Bar G & L Horiz. Boring Mill.

14"x6" Sebastian Geared Head Lathe.

18"x16"-28"x16" Bradford L.C. Lathe.

18"x18" Sidney Monotrol G.H. Lathe.

20"x15" American G. M. Lathe.

24"x16" BeBlond Q. C. Lathe.

36"x24" American G. H. Lathe.

±2 to ±5 Cincinnati Plain Millers.

2" to 7" Radial Drills.

20" G & E Shaper, B.D.

24" Cincinnati Universal Shaper.

24" G & E Shaper, B.D.

±4 Warner & Swasey Turret Lathe.

36"x36"x12" Cincinnati Planer.

42"x42"x14" Gray Planer.

Many other sizes and types of machines.

*Send us your inquiries*

**CINCINNATI MACHINERY COMPANY, INC.**

217 E. Second St., Cincinnati 2, Ohio

## FOR SALE

### Copper Cable New On Reels

8,000 ft. 300,000 C.M.

1,000 ft. 350,000 C.M.

5,500 ft. 4/0, 3 conductor.

2,000 ft. #2, 2 conductor.

8,000 ft. #2, 3 conductor.

*In Stock at Knoxville.*

**GLAZER STEEL CORPORATION**  
Knoxville, Tennessee Phone 48601

## WIRE ROPE FOR SALE

Brand New—Ind. Wire Rope Center, 1½" dia. 6x19. Plow steel. Various lengths from 160 ft. to 8,000 ft. each reel. Also other sizes. Send for list.

**TERRY WYNN**

Box 118 Wash. Bridge Sta., N. Y. C.

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## SEARCHLIGHT SECTION

### ROTARY CONVERTERS

500 KW GE. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM. Pedestal Type. 2300 V. Transformer and Switchgear.

300 KW GE. SYN., 575 V., 6 Ph., 60 Cy., 1200 RPM. Pedestal Type. 2300/4000 V. Transformers and Switchgear.

150 KW WEST. SYN., 275 V., 6 Ph., 60 Cy., 1200 RPM. Pedestal Type. 2300/4000 V. Transformers and Switchgear.

### MOTOR GENERATORS

500 KW GE. SYN., 575 V., 2300/4000 V., 3 Ph., 60 Cy., 900 RPM. Complete Manual Switchgear.

400 KW GE. SYN. 275 V., 2300/4000 V., 3 Ph., 60 Cy., 900 RPM. Complete Manual Switchgear.

300 KW RIDGWAY Syn. 275 V., 2200 V., 3 Ph., 60 Cy., 1200 RPM. Complete Manual Switchgear.

150 KW WEST. SYN., 275 V., 2300 V., 3 Ph., 60 Cy., 900 RPM. Complete Manual Switchgear.

### LOCOMOTIVES

15-T G.E. 500 V., HM-827 Mts., 36"-42" Ga.  
10-T JEFFREY, 250 V., MH-110 Mts., 36"-48" Ga.  
10-T WEST., 500 V., 907-C Mts., 36"-44" Ga.  
10-T WEST., 250 V., 907-C Mts., 36"-44" Ga.  
8-T WEST., 250 V., 908-C Mts., 42"-48" Ga.  
6-T G.E., 250 V., HM-701 Mts., 30"-36" Ga.  
6-T WEST., 250 V., 903-B Mts., 22"-30" Ga.  
6-T WEST., 250 V., 904-C Mts., 36"-42" Ga.

Each unit listed above is owned by us and is available now for immediate purchase

**WALLACE E. KIRK COMPANY**  
Incorporated  
501 Grant Building, Pittsburgh, Pa.

### Stock NEW MOTORS

3 to 15 hp, 1,200 and 1,800 rpm., 220/440, 3 phase, 60 cycle, ball bearing type AR Allis-Chalmers Squirrel Cage Induction.

Also

Rebuilt Motors; Starters; House Meters; Lightning Arrestors, Strain Insulators; Rotary Converters; Transformers; Switchboard Parts, including large knife switches, meters, contactors, relays, large solderless lugs.

R. H. Benney Equipment Co.  
5024 Montgomery Road Norwood, Ohio

**Locomotives, Shovels,  
Cranes, Crushers,  
Compressors, Hoists,  
Belt Conveyors,  
Screens, Feeders, etc.**

**A. J. O'NEILL**  
Lansdowne Theatre Bldg.  
LANSDOWNE, PA.  
Phila. Phones: Madison 8300-8301

## For Sale: SHOVELS - DRAGLINES TRACTORS - DRILLS

**Model 621-S Page Diesel (two engine) Walking Dragline.** 125' boom, 7-yard Page bucket.

**Model 1201 Lima Diesel Dragline.** 80' boom, 3-yard bucket, Type L Cummins engine.

**955 P&H Diesel Dragline and Crane.** Dragline boom 90', 2½-yard bucket, Caterpillar D17000 engine. Long crawlers—40" treads.

**K-595 Link-Belt Diesel Dragline.** 80' boom, 2½-yard bucket. Waukesha-Hesselman engine.

**Model 1001 Lima Diesel Dragline.** 80' boom, 2½-yard bucket. Waukesha-Hesselman engine.

**95 Northwest Dragline.** 80' boom, 2½-yard bucket, Murphy Diesel engine. Wide long cats.

**80D Northwest Dragline.** 80' boom, 2-yard bucket, Murphy Diesel engine.

**95 Lorain Dragline.** D17000 Caterpillar Diesel engine, 75' boom, 2-yard bucket.

**Model 855 P&H Long Crawler Dragline.** Hydraulic control. 78' boom, 2½-yard Page bucket. D17000 Caterpillar Diesel engine.

**38A Marion Diesel Dragline.** 75' boom, 2-yard bucket, 7x7 Hesselman engine.

**4101 Marion Electric Dragline.** 90' boom, 2½-yard bucket.

**Model 850 Lima Combination Shovel and Dragline.** 22' shovel boom, 19'

dipper stick, 2-yard dipper, 75' dragline boom, 2-yard bucket; 18' 11" crawlers for dragline operation. 7x7 Waukesha-Hesselman oil engine. A-1 shape.

**Model 850 Lima Diesel Long Crawler Dragline.** 75' boom—2-yard bucket. 7x7 Waukesha-Hesselman engine.

**77 Lorain 1½-yard Shovel.** D13000 Caterpillar Diesel engine.

**Link Belt ¾-yard Speeder Shovel and Clam.** Completely rebuilt.

**¾-yard General Shovel.** Cummins Diesel engine. 1938 machine. Good condition.

**¾-yard Lima Paymaster Combination Shovel, Backhoe and Dragline.** Gasoline engine.

**D-7 Caterpillar Tractor and Bulldozer.**

**TD18 International Tractor and Angledozer.** New.

**Model 27T Bucyrus-Armstrong Well Drill.** Caterpillar Diesel engine. Tools for 6" holes.

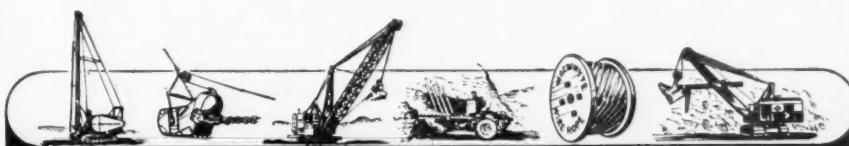
**Model 22T Bucyrus-Erie Well Drill** with tools for 6" holes.

**315 Cu. Ft. Worthington Diesel Air Compressor** with Caterpillar 8800 Diesel engine mounted on 10-wheel truck. (250 hours on compressor).

**Brand New Parmanco Horizontal Auger Drill.**

**Brand New Kohler 1500-watt Light Plants.**

We try to carry in stock various sizes of Page automatic dragline buckets. We may have the size you need for immediate delivery.



**FRANK SWABB EQUIPMENT CO.**  
Hazleton National Bank Bldg., Hazleton, Penna. PH 4-5112-2 and 49112

### IRON and STEEL PIPE

New and Used

Large stocks, all sizes  
attractive prices

**L. B. FOSTER COMPANY**  
P. O. Box 1647 Pittsburgh 30, Pa.

NEW and REBUILT  
STORAGE BATTERY

### LOCOMOTIVES

1½ to 10 Ton 13" to 58" Track Gauge  
GREENSBURG MACHINE CO.  
Greensburg, Pa.

### PIPE - MACHINERY - GAS ENGINES AIR COMPRESSORS - DIESELS - PUMPS

Some Steam Engines and Boilers available only slightly above the metal price

**BRADFORD SUPPLY COMPANY**

WAYNE, WOOD COUNTY, OHIO

Near Toledo

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CONVEYOR BELTING,  
TRANSMISSION BELTING,  
ELEVATOR BELTING,  
FIRE, WATER, AIR,  
STEAM, SUCTION and  
WELDING HOSE.

CARLYLE RUBBER PRODUCTS ARE NEW, GUARANTEED & LOW PRICED

### CONVEYOR BELTING

#### ABRASIVE RESISTANT COVERS

Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"
42"	5	1/8"	1/16"
36"	6	1/8"	1/16"
30"	6	1/8"	1/16"
30"	5	1/8"	1/16"
26"	5	1/8"	1/32"
24"	5	1/8"	1/32"

Width	Ply	Top-Bottom	Covers
24"	4	1/8"	1/32"
20"	5	1/8"	1/32"
20"	4	1/8"	1/32"
18"	4	1/8"	1/32"
16"	4	1/8"	1/32"
14"	4	1/16"	1/32"
12"	4	1/16"	1/32"

Inquire For Prices — Mention Size and Lengths

### TRANSMISSION BELTING

#### HEAVY-DUTY FRICTION SURFACE

Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

### ENDLESS "V" BELTS

"A"	Width	All Sizes	—
"B"	Width	All Sizes	—
"C"	Width	All Sizes	—
"D"	Width	All Sizes	—
"E"	Width	All Sizes	—

Sold in Matched Sets.  
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Mention Size and Lengths.

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APPROVED SPECIFICATION HOSE EACH LENGTH WITH COUPLINGS ATTACHED

I.D. Size	Length	Per Length
2 1/2"	50 feet	\$28.00
—	25 "	16.00
2"	50 "	23.00
—	25 "	13.00
1 1/2"	50 "	20.00
—	25 "	11.00

Specify Thread On Couplings

#### AIR HOSE

I.D. Size	Length	per Length	Universal Couplings
1/2"	25 feet	\$5.00	\$1.50 Pair
—	50 "	10.00	1.50 Pair
3/4"	25 "	7.50	1.50 Pair
—	50 "	15.00	1.50 Pair
1"	25 "	10.00	1.50 Pair
—	50 "	20.00	1.50 Pair

LARGER SIZES ALSO AVAILABLE  
All Prices—Net — F.O.B. New York

#### WATER HOSE

I.D. Size	Length	per Length
3/4"	25 feet	\$4.25
—	50 "	8.00
1"	25 "	6.25
—	50 "	12.50
1 1/4"	25 "	7.50

I.D. Size	Length	per Length
—	35 feet	\$10.50
—	40 "	12.00
—	50 "	15.00
1 1/2"	25 "	10.00
—	35 "	14.00
—	50 "	20.00

Each Length with Couplings Attached

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250 KW Croc. Wh. D.C. Genl., Com. Interpole, 125 V., 2,000 Amp., 150 RPM, D.C. to Erie Ball high speed non-releasing gear Corliss Eng., 4 valve eng. # 6772, size 24 x 27# pres., new 1925. Good con.

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2—29 C Jeff 250 v. HP 250 v. 6' Bar, rebuilt.

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2—6 Ton G.E., permissible 36/44 Ga. HM 825 BB Motors, with Edison Batteries.

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5½ Ton Type D Ironton, 42" Ga.

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50 KW G.E. 125 v.—75 HP West. 220/440.

50 KW G.E. 125 v.—75 HP G.E. 2200 v.

35 KW Cr. Wh. 250 v.—50 HP 220/440 v.

15 KW Cr. Wh. 250 v.—220/440 v./3/60.

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3—New 10 KW 125 v.—220/440 v./60.

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HP	Make	Speed	Wdg.	Type	HP	Make	Speed	Wdg.	Type
1400	West.	1200	Syn.	New 1 P.F.	1200 KW Al. Ch.	750	cpd.	500 v.	
1000	West.	1200	Syn.	New 8 P.F.	1500	West.	600	sh.	600 v.
750	West.	1200	Syn.	New 7 P.F.	200	Cr. Wh.	500	sh.	CM
500	G. E.	257	S.R.	MT	175	G. E.	475	ser.	MD 109
350	G. E.	900	S.R.	1-M	130	G. E.	550	ser.	CO 1812
300	West.	1800	S.R.	CW	100	G. E.	450	ser.	MD 108
250	West.	277	S.R.	CW 1314	100 KW West.	500	cp.	M	
225	West.	585	S.R.	MW	50	Northern	600	ser.	K
200	Cr. Wh.	505	S.R.		50	West.	565	cp.	SK 500 v.
200	G. E.	240	S.R.	MT 412	50	West.	250/1000	sh.	SK
200	West.	350	S.R.	CW	40	Reliance	1750	cp.	186 T
100	West.	1750	S.R.	C-1	40	G. E. (Vert)	1750	cp.	CD 98
100	G. E.	500	S.R.	M 1-25-cy.	35	Roth	1500	cp.	
75	G. E.	865	S.C.	JK	20	Cr. Wh.	700	sh.	CM
50	West.	580	S.R.	CW 658 D	15	West.	750	ep.	SK 98
50	G. E.	900	S.R.	1-M	15	West.	850	ep.	CM
35	West.	870	S.C.	CS	10 (3) G.E.	800	sh.	CD	
					7½ G.E.	1400/1700	sh.		
					13 West. (Enc.)	825	ep.	SK 113	
					10 (3) G.E.	1750	sh.		
					7½ G.E.	1750	sh.		

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400	HP. Vulcan conical drum	Shaft Hoist
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10	Ton Larry Car 500/250 v. DC.	
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75	HP Ottumwa slope with AC Motor.	
75	HP Vulcan 2 drum shaft, S.R. Motor.	
40	HP Lidgerwood sgt. fr. drum geared to A.C. motor.	
1	1 Ton AC Monorail 220/3/60.	
10	HP Link Belt Car Spotter AC Motor.	
5	HP Lidgerwood 230 v. DC Room Hoist.	
4—2720 GPM 85° Le Courtney Bronze fitted 10°.		
1—700 GPM 60° Wheeler Bronze fitted 5° Cent.		
2—10 HP Fridy Car Spotter AC motor.		
625 GPM 12° Hd. DeLaval 10 HP 230 v. DC.		
300 GPM 44° Hd. DeLaval 10 HP 230 v. DC.		
300 GPM 35° Hd. DeLaval 1½ HP, 230 v. DC.		
150 GPM 53° Hd. DeLaval 5 HP, 230 v. DC.		

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1200 cu. ft. 100# Worthington 2 stage Belted.

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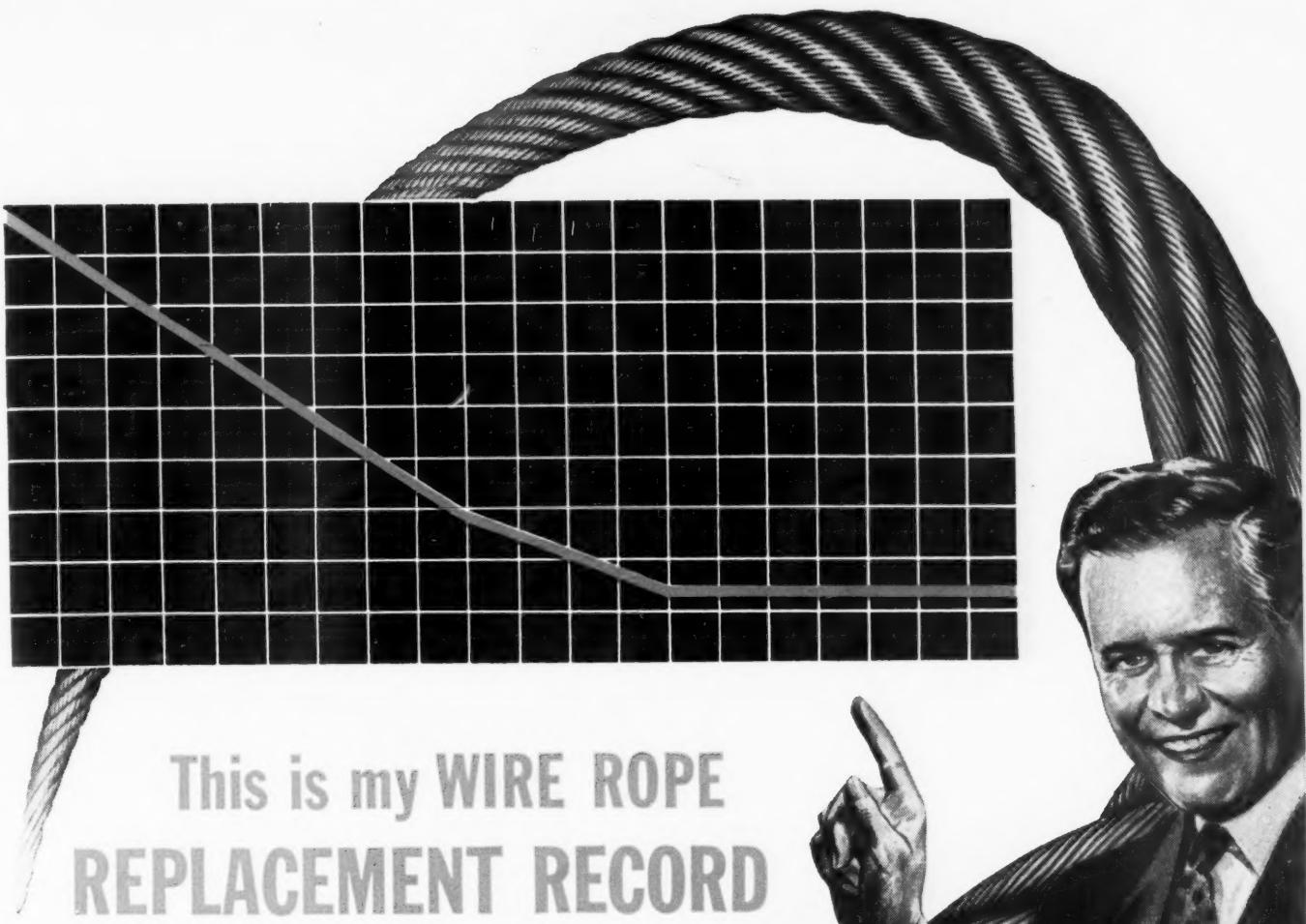
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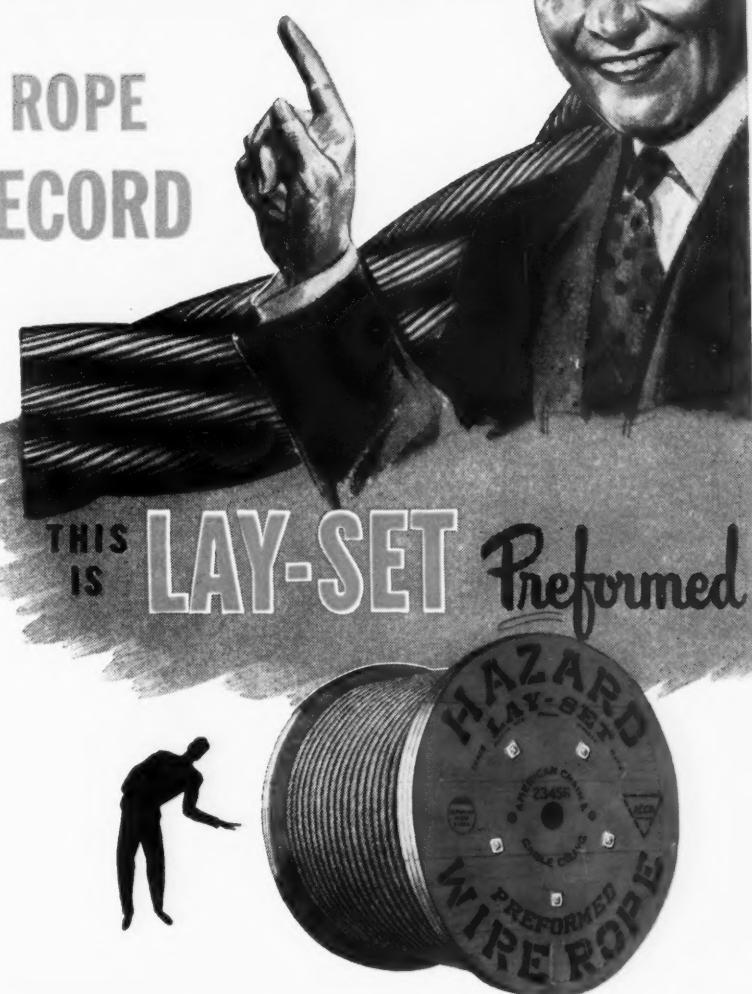
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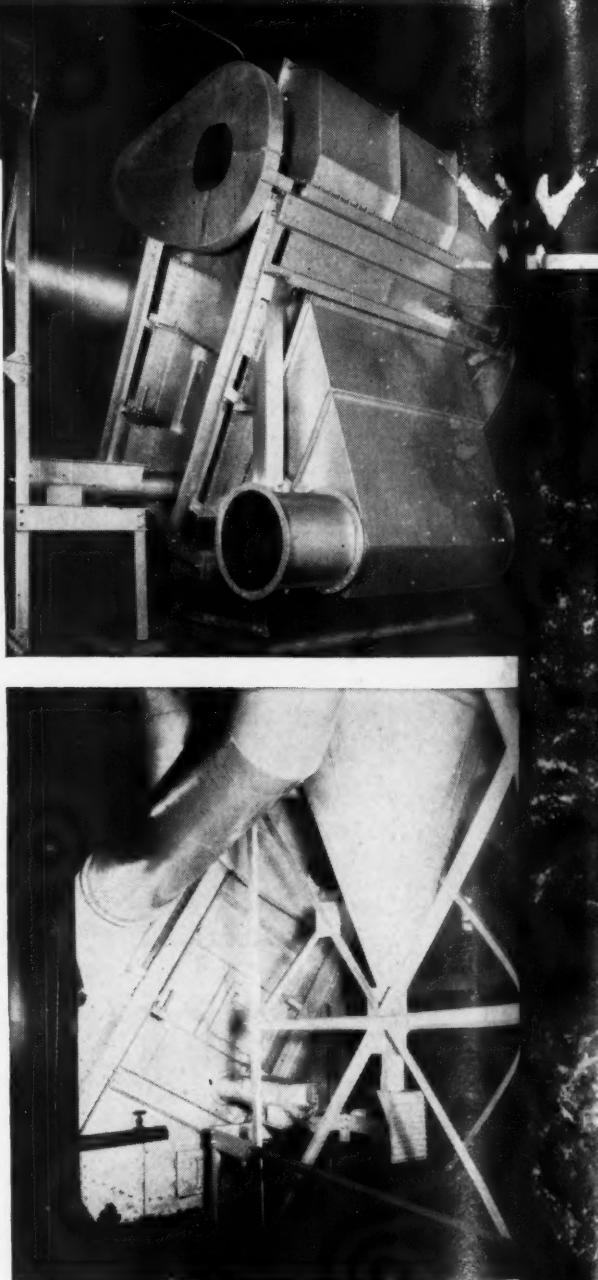
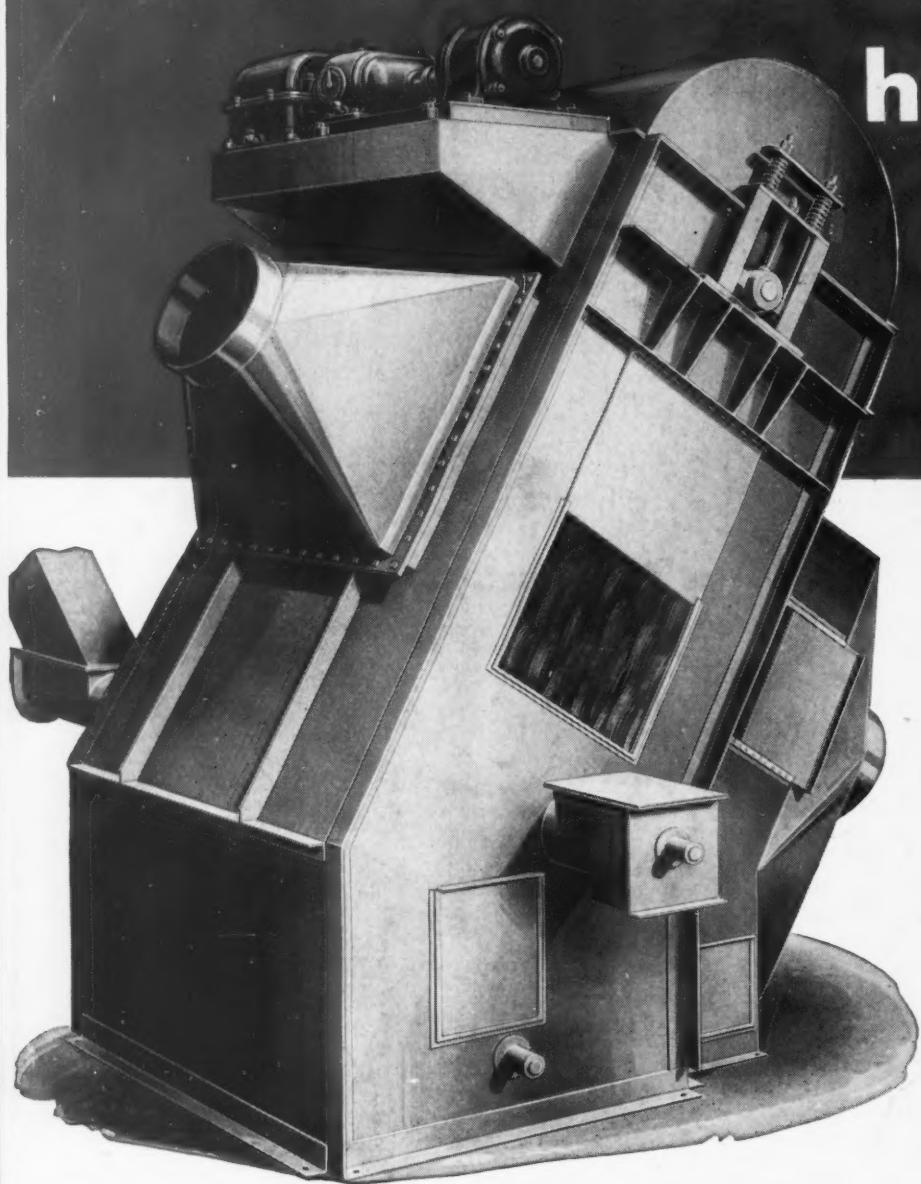


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- Short contact time with the drying air; large pieces do not tend to overheat.

—Simplicity in control of temperatures and volume of drying air.  
—Cooling section may be very easily added, for cool discharge into cars or bins.

—Operation and maintenance extremely simple and economical. It is essentially an apron conveyor.

Illustrations at the right show details of a typical installation drying coal for coking purposes. Why not call on one of our engineers to give you the complete story? Send for Book No. 2209.

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### COAL PREPARATION AND HANDLING EQUIPMENT

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